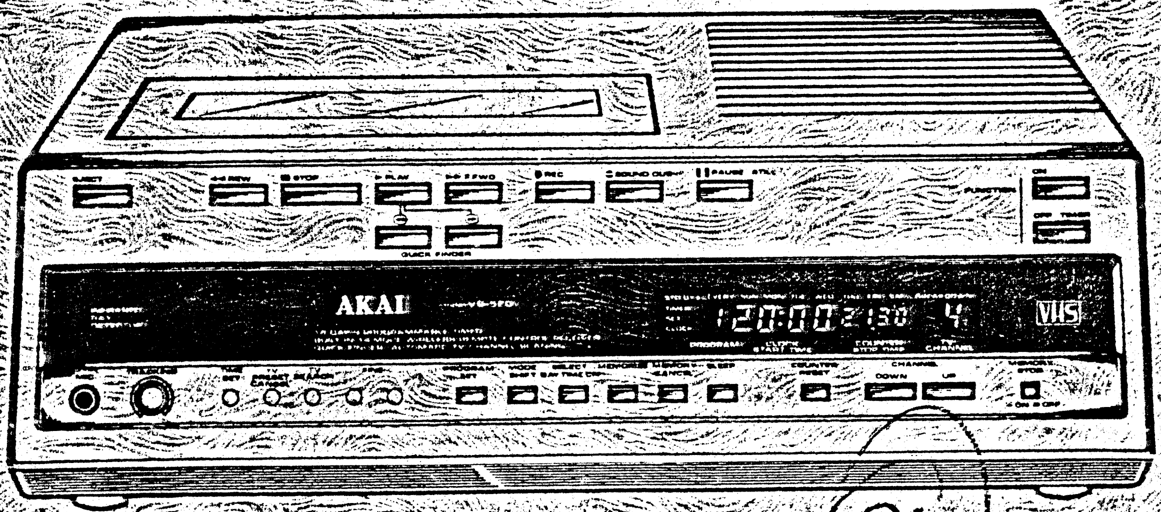
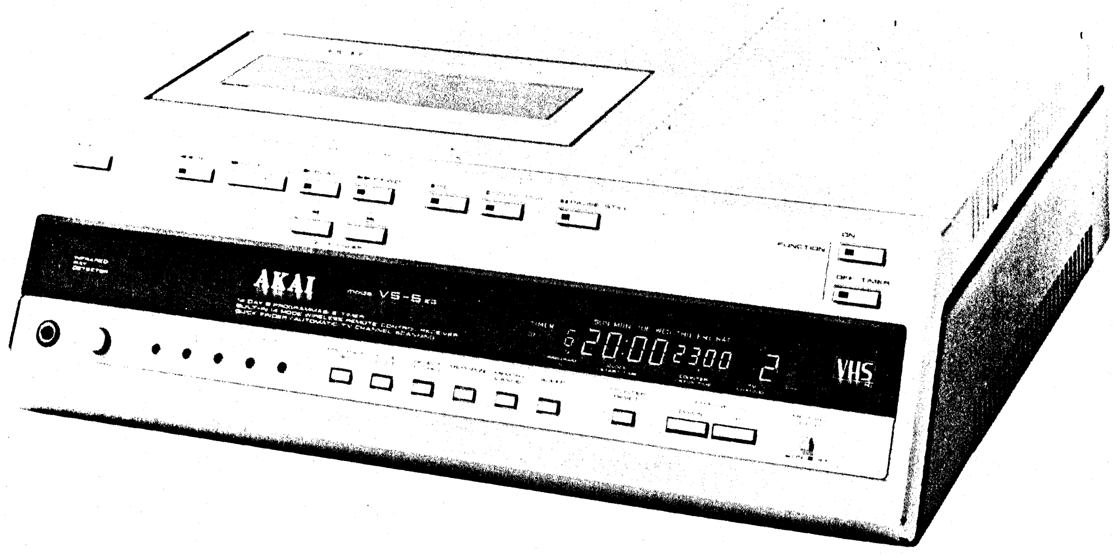
# AKAI SERVICE MANUAL


EJECT
STOP
PLAY
REC
PAUSE STILL
FUNCTION
ON
QUICK FINDER
AKAI
VHS
PROGRAM
CLOCK START TIME
COUNTER STOP TIME
CHANNEL
DOWN
UP

89

VIDEO CASSETTE RECORDER

## MODEL VS-5EG/EK



# VIDEO CASSETTE RECORDER

# MODEL VS-5EG/EK

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# I. SPECIFICATIONS

| | | |
|---|---|---|
| FORMAT | | VHS PAL Standard |
| VIDEO RECORDING SYSTEM | | Rotary, slant azimuth two-head helical scan system |
| VIDEO SIGNAL SYSTEM | | PAL colour and CCIR monochrome signals, 625 lines |
| TAPE WIDTH | | 12.7 mm |
| TAPE SPEED | NORMAL | 23.39 mm/sec |
| | FF/REW | 4 min. (AKAI E-240 cassette) |
| | QUICK FINDER | Approx. 9 times normal speed |
| RECORDING SPEED | | 240 min. (AKAI E-240 cassette) |
| POWER REQUIREMENTS | | 220V/110V (VS-5EG), 200V/240V (VS-5EK)<br>AC selectable, 50 Hz 37 Watts (Including video timer) |
| OPERATING TEMPERATURE | | 5°C to 40°C |
| AERIAL INPUT | VS-5EG | VHF Band I, Channels 2 to 4,<br>VHF Band III, Channels 5 to 12,<br>UHF Band IV/V, Channels 21 to 69 |
| | VS-5EK | UHF Band IV/V, Channels 21 to 69 only |
| AERIAL OUTPUT | | UHF Channels 30 to 39 (adjustable)<br>Set to channel 36 prior to shipment |
| VIDEO SIGNAL | INPUT | 0.5 to 2.0 Vp-p/75 ohms (video/sync ratio should be normal) |
| | OUTPUT | 1.0 Vp-p/75 ohms |
| | S/N | More than 43 dB |
| HORIZONTAL RESOLUTION | | More than 240 lines |
| AUDIO SIGNAL INPUT | MIC | –70 dBs/high impedance unbalanced |
| | LINE | –20 dBs/50 kohms unbalanced |
| AUDIO SIGNAL OUTPUT | | –6 dBs/less than 1 kohm unbalanced |
| S/N | | More than 40 dB |
| FREQUENCY RESPONSE | | 70 Hz to 8 kHz |
| VIDEO TIMER | CLOCK DISPLAY | 24 hour fluorescent digital display |
| | CLOCK REFERENCE | Locked to power line frequency, 50/60 Hz self select |
| | NUMBER OF PROGRAMS | 9 programs possible:<br>Five 14 days one time memory programs<br>Two every day programs<br>Two every week programs<br>Sleeper operation possible |
| DIMENSIONS | | 440(W) x 133(H) x 398(D) mm (17.3 x 5.2 x 15.7 inches) |
| WEIGHT | | 12 kg (26.4 lbs) |

* For improvement purposes, design and specifications are subject to change without notice.

SECTION 1

# SERVICE MANUAL

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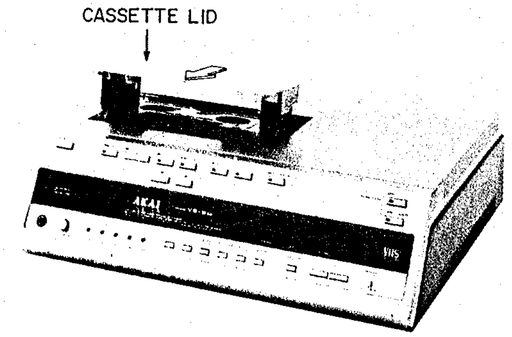
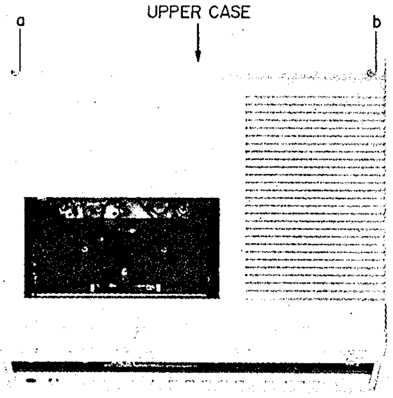
# II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.

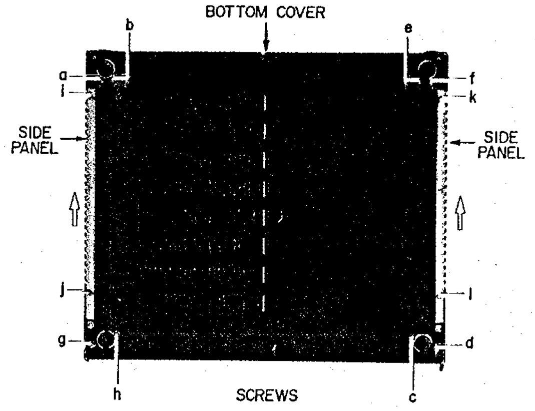
1


CASSETTE LID

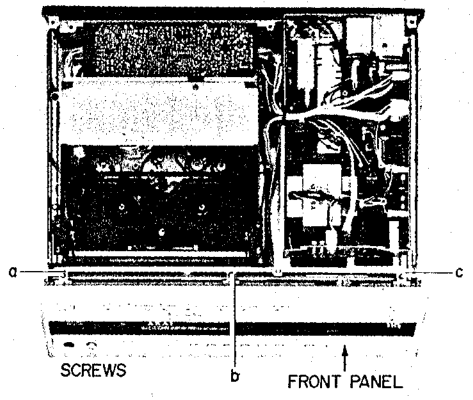
2


a
UPPER CASE
b

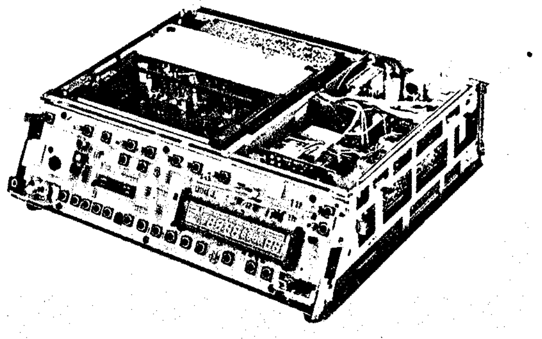
3


BOTTOM COVER
b
e
a
i
f
k
SIDE PANEL
SIDE PANEL
j
l
g
d
h
SCREWS
c

4


a
c
SCREWS
b
FRONT PANEL

5



# III. CONTROLS

## 1. VS-5EG/EK

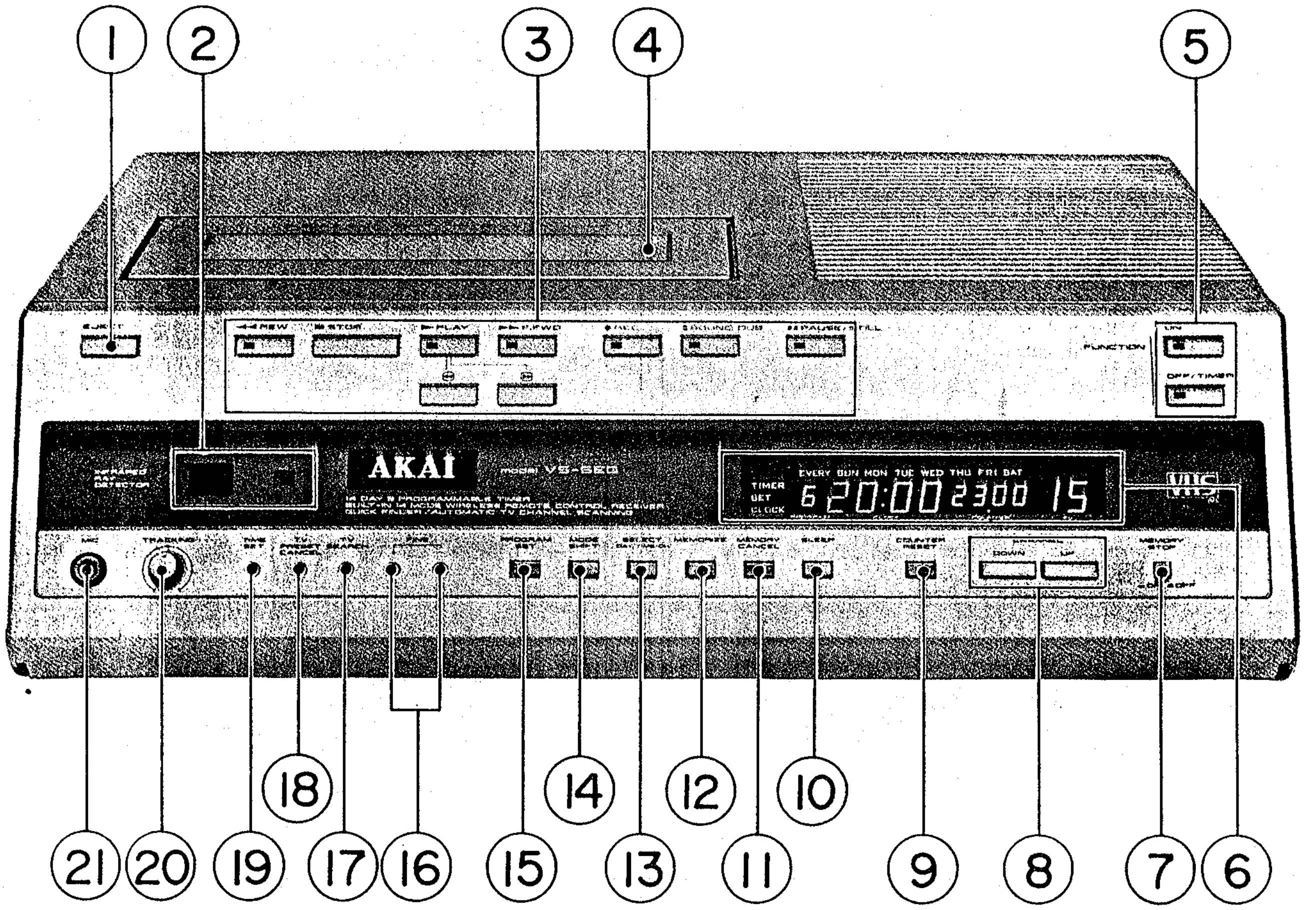

①
②
③
④
⑤
EJECT
REW
STOP
PLAY
F.FWD
REC
AUDIO DUB
PAUSE/STILL
FUNCTION
ON
OFF/TIMER
AKAI
model VS-5EG
EVERY SUN MON TUE WED THU FRI SAT
TIMER
SET
CLOCK
6 20:00 2300 15
VHS
MIC
TRACKING
PROGRAM SET
MODE SHIFT
SELECT
MEMORIZE
MEMORY CANCEL
SLEEP
COUNTER RESET
DOWN
UP
MEMORY STOP
⑱
⑭
⑫
⑩
㉑
⑳
⑲
⑰
⑯
⑮
⑬
⑪
⑨
⑧
⑦
⑥

Fig. 1

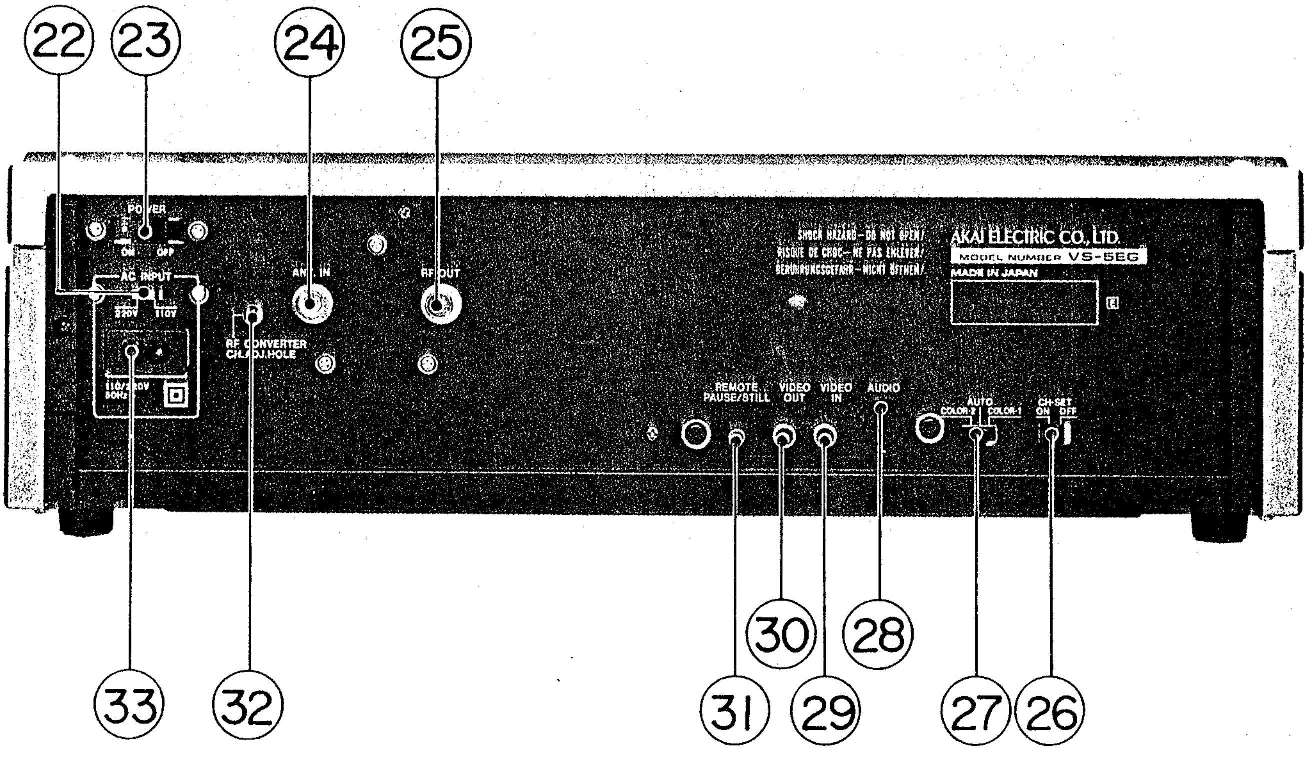

㉒
㉓
㉔
㉕
POWER
ON
OFF
AC INPUT
220V
110V
110/220V
50Hz
ANT. IN
RF OUT
RF CONVERTER
CH.ADJ.HOLE
SHOCK HAZARD—DO NOT OPEN/
RISQUE DE CHOC—NE PAS ENLEVER/
BERÜHRUNGSGEFAHR—NICHT ÖFFNEN/
AKAI ELECTRIC CO., LTD.
MODEL NUMBER VS-5EG
MADE IN JAPAN
REMOTE PAUSE/STILL
VIDEO OUT
VIDEO IN
AUDIO
AUTO
COLOR-2
COLOR-1
CH-SET
ON
OFF
㉚
㉘
㉝
㉜
㉛
㉙
㉗
㉖

Fig. 2

1. EJECT BUTTON
2. INFRARED RAY DETECTOR and
   REMOTE CONTROL INDICATOR
3. OPERATING BUTTONS
4. CASSETTE HOLDER
5. FUNCTION BUTTONS (ON and OFF/TIMER)
6. DIGITAL DISPLAY (PROGRAM, CLOCK/START TIME,
   COUNTER/STOP TIMER and TV CHANNEL)
7. MEMORY STOP SWITCH
8. CHANNEL BUTTONS
9. COUNTER RESET BUTTON
10. SLEEP BUTTON
11. MEMORY CANCEL BUTTON
12. MEMORIZE BUTTON
13. SELECT DAY/TIME/CHANNEL (CH) BUTTON
14. MODE SHIFT BUTTON
15. PROGRAM SET BUTTON
16. FINE TUNING HOLES
17. TV SEARCH HOLE
18. TV PRESET CANCEL HOLE
19. TIME SET HOLE
20. TRACKING CONTROL
21. MICROPHONE (MIC) JACK
22. AC INPUT SELECTOR
23. POWER SWITCH
24. ANTENNA (ANT.) IN JACK
25. RF. OUT JACK
26. CHANNEL (CH.) SET SWITCH
27. VIDEO MODE SELECTOR
28. AUDIO JACK
29. VIDEO IN JACK
30. VIDEO OUT JACK
31. REMOTE PAUSE/STILL JACK
32. RF CONVERTER CHANNEL (CH.)
    ADJUSTMENT (ADJ.) HOLE
33. AC INLET

## 2. REMOTE CONTROL UNIT RC-V5

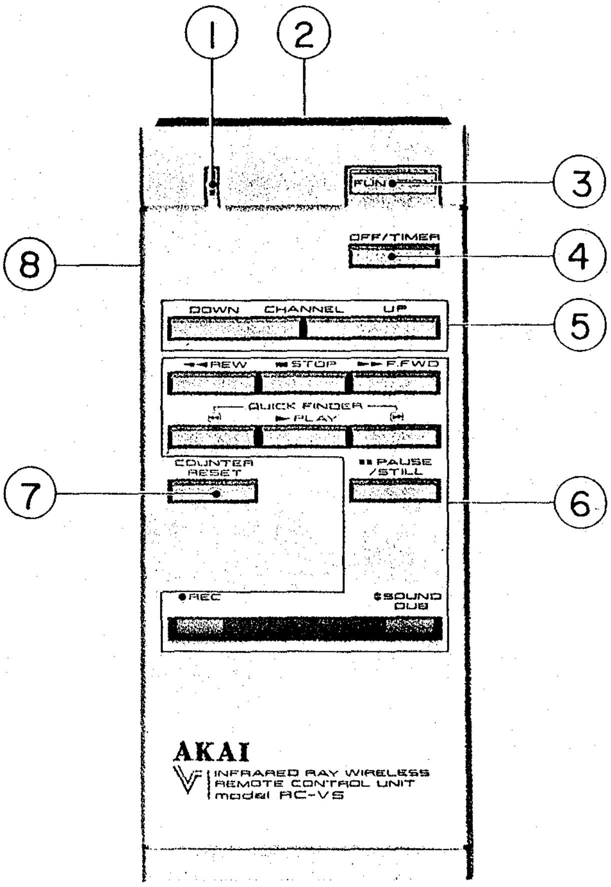

1
2
3
4
5
6
7
8
FUN
OFF/TIMER
DOWN CHANNEL UP
◄◄REW
■STOP
►►F.FWD
QUICK FINDER
►PLAY
COUNTER RESET
■■PAUSE /STILL
●REC
SOUND DUB
AKAI
INFRARED RAY WIRELESS REMOTE CONTROL UNIT model RC-V5

Fig. 3

1. REMOTE CONTROL INDICATOR
2. TRANSMITTING WINDOW
3. FUNCTION BUTTON
4. OFF/TIMER BUTTON
5. CHANNEL BUTTONS
6. OPERATING BUTTONS
7. COUNTER RESET BUTTON
8. SAFETY LOCK

# IV. PRINCIPAL PARTS LOCATION

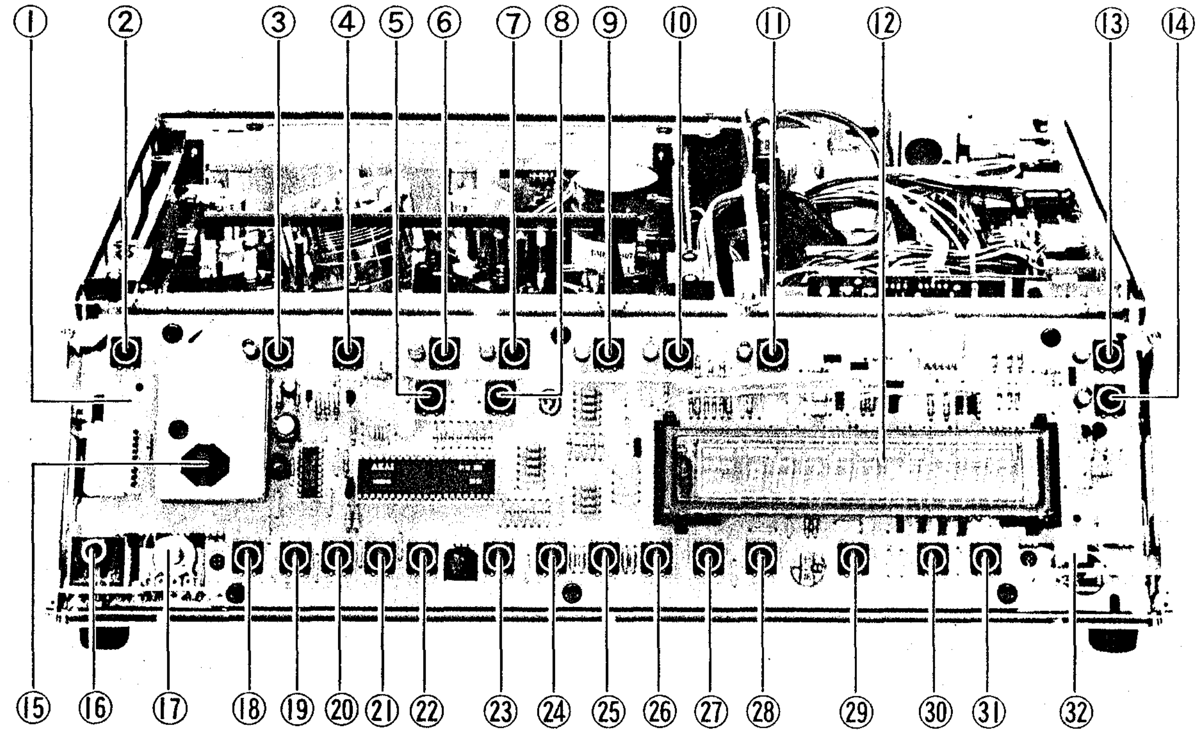


Fig. 4 Front View

1. DISPLAY P.C BOARD V1004A5440
2. EJECT SWITCH
3. REW SWITCH
4. STOP SWITCH
5. QUICK FINDER ( ◀◀ ) SWITCH
6. PLAY SWITCH
7. F.FWD SWITCH
8. QUICK FINDER ( ▶▶ ) SWITCH
9. REC SWITCH
10. SOUND DUB SWITCH
11. PAUSE/STILL SWITCH
12. DIGITAL DISPLAY
13. FUNCTION ON SWITCH
14. FUNCTION OFF/TIMER SWITCH
15. INFRARED RAY DETECTOR
16. MIC JACK
17. TRACKING VOLUME
18. TIMER SET SWITCH
19. TV PRESET CANCEL SWITCH
20. TV SEARCH SWITCH
21. FINE TUNING SWITCH (+)
22. FINE TUNING SWITCH (–)
23. PROGRAM SET SWITCH
24. MODE SHIFT SWITCH
25. SELECT DAY/TIME/CHANNEL SWITCH
26. MEMORIZE SWITCH
27. MEMORY CANCEL SWITCH
28. SLEEP SWITCH
29. COUNTER RESET SWITCH
30. CHANNEL SWITCH (DOWN)
31. CHANNEL SWITCH (UP)
32. MEMORY STOP SWITCH

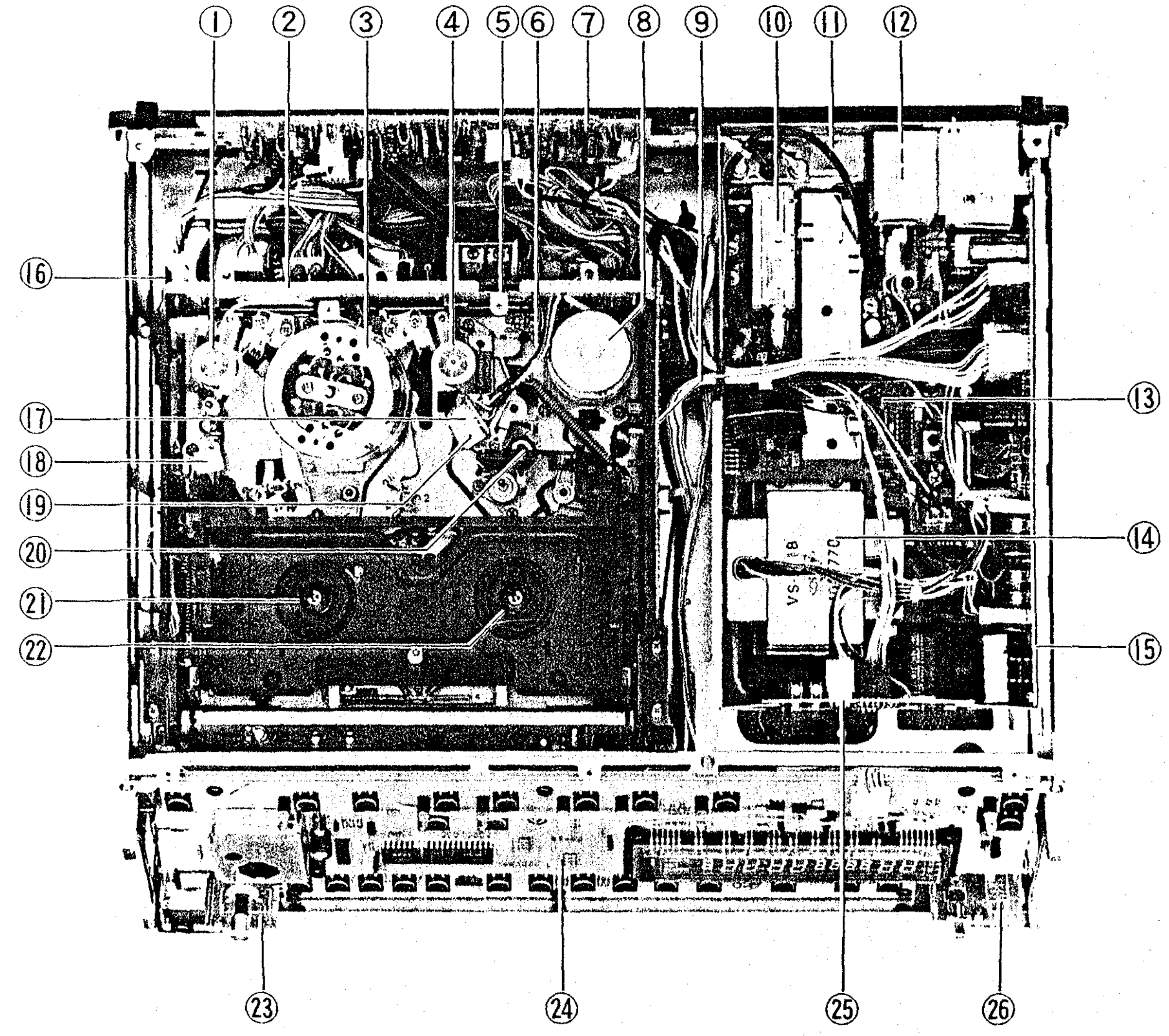


Fig. 5 Top View

1. S. IMPEDANCE ROLLER
2. DRUM MOTOR P.C BOARD V1004B5490
3. DRUM HEAD BLOCK
4. T.U IMPEDANCE ROLLER
5. CAPSTAN MOTOR P.C BOARD V1004B5491
6. C.M FILTER P.C BOARD V1004D5500
7. AUDIO P.C BOARD V1004A5350
8. CAPSTAN MOTOR
9. DRIVE P.C BOARD V1004B5360
10. TUNER UNIT
11. ANTENNA BOOSTER
12. RF CONVERTER
13. TUNER P.C BOARD KB240303
14. POWER TRANS
15. POWER SUPPLY P.C BOARD KA240178
16. SENSOR P.C BOARD V1004C5370
17. AUDIO ERASE HEAD
18. FULL ERASE HEAD
19. AUDIO/CONTROL HEAD
20. PINCH ROLLER
21. SUPPLY REEL
22. TAKE UP REEL
23. MIC P.C BOARD V1004C5380
24. DISPLAY P.C BOARD V1004A5440
25. POWER SUB P.C BOARD
26. MEMORY P.C BOARD V1004C5381

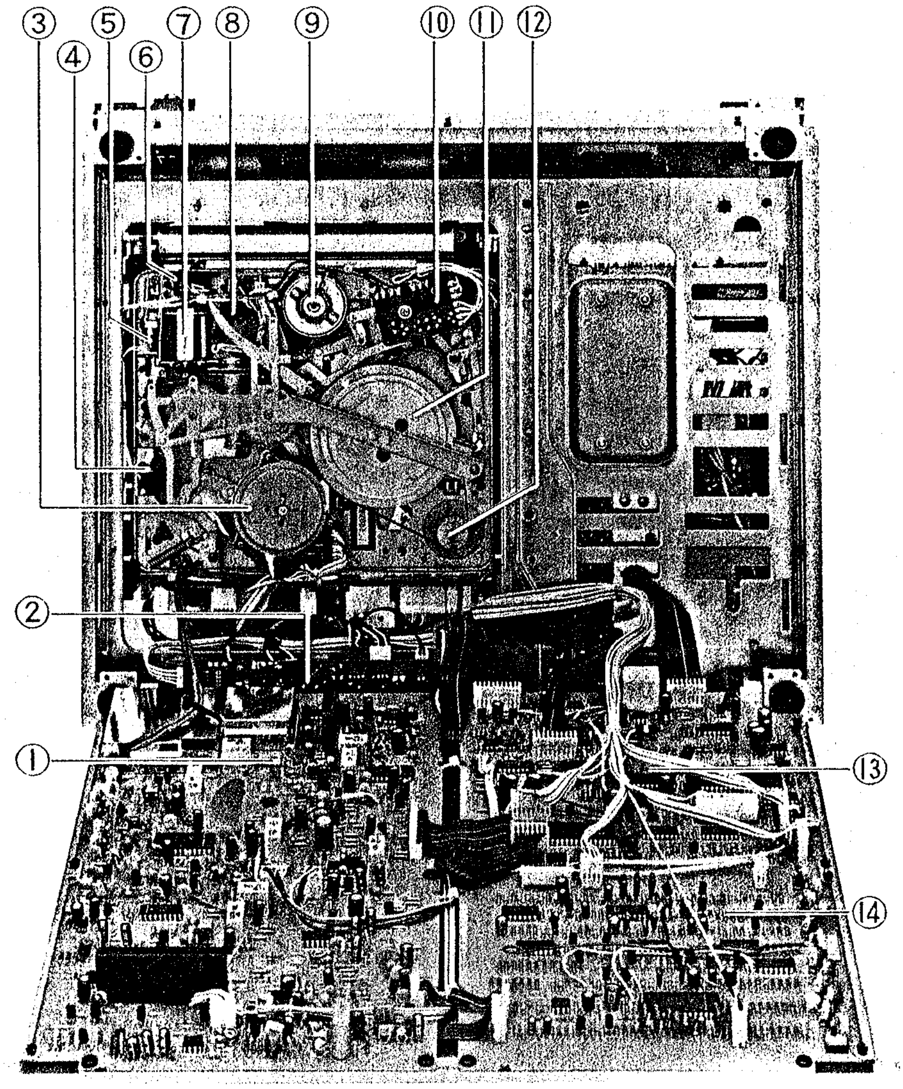


Fig. 6 Bottom View

1. VIDEO P.C BOARD V1004A5420
2. REAR P.C BOARD V1004C5390
3. DRUM MOTOR
4. LOADING SWITCH A
5. EJECT SWITCH
6. REC SAFETY SWITCH
7. LOADING MOTOR
8. LOADING SWITCH B
9. REEL MOTOR
10. MOTOR FILTER P.C BOARD V1004D5400
11. CAPSTAN FLYWHEEL
12. CAPSTAN MOTOR
13. SYSCON P.C BOARD V1004A5341
14. SERVO P.C BOARD V1004A5340

# V. VOLTAGE CONVERSION

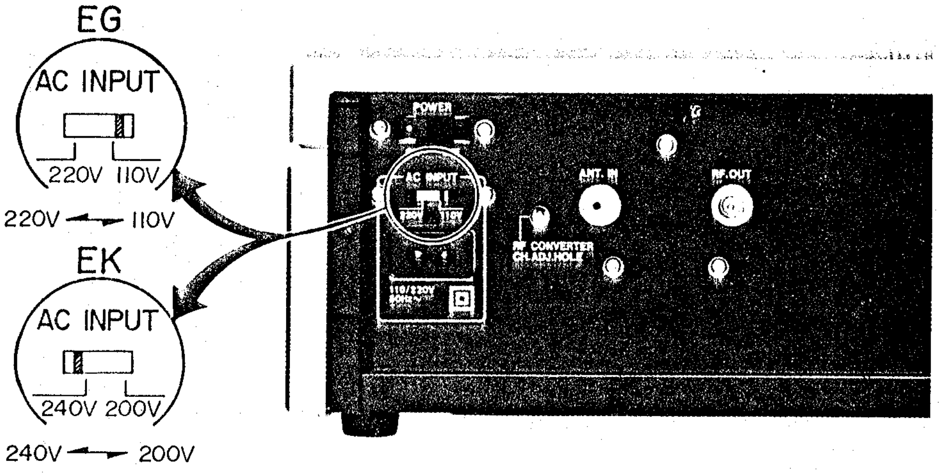

EG
AC INPUT
220V 110V
220V ↔ 110V
EK
AC INPUT
240V 200V
240V ↔ 200V
POWER
AC INPUT
ANT. IN
RF.OUT
RF CONVERTER CH.ADJ.HOLE
110/220V

Fig. 7

Power requirements for electrical equipment differ from area to area. The operating voltage of VS-5 is preset to 220V (VS-5EG) or 240V (VS-5EK). Before connecting, check that the AC INPUT selector on the rear panel is set to the voltage for your area:
220V, 50 Hz for Europe except UK
240V, 50 Hz for UK
110V, 200V, 220V or 240V, 50 or 60 Hz for other countries. (If in doubt, consult a qualified electrician.)
If the AC INPUT is not set for your area:

1. Confirm that the POWER Switch on the rear panel is set to OFF.
2. Confirm that the POWER Cord is disconnected.
3. Move the AC INPUT selector with a screwdriver so that the marker is above the voltage for your area.

# VI. CIRCUIT DESCRIPTION

## 1. MAIN FEATURES OF VS-5

Main features of VS-5 are as follows.

### 1-1. Buzzer Alarm

In any one of the following cases, the built-in buzzer issues a warning.

1) Tape End
   When the clear tapes attached to the starting end and finishing end of the tape pass in front of the sensor in any mode.
2) Counter "0000"
   When the counter passes "0000" in FF or REW.
3) Rec. Safety
   Rec button or sound dub button is pressed when using the tape whose erasure prevention tab is snapped off.
4) Break-down
   When break-down occurs in VS-5 for some reasons, the break-down is indicated and the power supply is cut off.

### 1-2. Quick Finder

- Noise-less playback of 9 time speed (normal and reverse direction) is possible, and since the noise bar is only produced in the fixed position, the picture does not flicker and it is easy to see.

### 1-3. STILL, Frame Advance, Slow Motion, Playback

1) STILL
   Still picture can be obtained by pressing the PAUSE/STILL button while playing.
2) Frame Advance
   One frame can be advanced each time the PAUSE/STILL button is pressed while playing.
3) Slow Motion
   Slow motion playback is possible by pressing continuously the PAUSE/STILL button for more than 0.5 seconds.

It should be noted that if the still mode is kept for more than 90 seconds, it will be automatically changed to the stop mode to protect the tape.

### 1-4. Auto Tuning Synthesizer Tuner

By pressing the TV Search button, the TV signal is automatically caught and the scanning is automatically stopped at the best point.

If the TV station is desired to be memorized, it can be stored in the desired channel by pressing the MEMORIZE button. The memory capacity consists of 16 channels (16 TV stations) and hey can be memorized at random regardless of the kind (high or low) of the frequency.

Also the auto tuning is available in the follwing order.

UHF → VHF (H) → VHF (L)

and the band is automatically switched and at the same time the band indication is changed as follows.

U → H → L

The channels are backed up by the internal rechargeable batteries for one week.

### 1-5. 14 Days (2 Weeks)/9 Programs Programmable Timer

9 program memory can store programs Ⓐ – Ⓒ as follows.

Ⓐ Once Program: Program ① – ⑤, once program stipulated within two weeks.
Ⓑ Everyday Program: Program ⑥ – ⑦, program to start and stop at a fixed time every day.
Ⓒ Weekly Program: Program ⑧ – ⑨, program at fixed time and on fixed day every week.

The program can be stored for one week by the built-in rechargeable battery. The indication after power failure is made by the lighting of the clock set. If any program is desired to be skipped, it can be skipped by pressing the Cancel button, and it can be read out and used (by pressing the Memorize button) provided that a new program is stored.

### 1-6. Front Operation Feather Touch Direct Function

The operation button is of feather touch type, and the lamp inside the operated button is lit so that it is easily confirmed which mode is being executed. Since the buttons not so often used during the ordinary operation are provided in the rear of the panel and operated by means of the operation rod provided, there is no fear of the memory erased due to misoperation.

For recording, just press the "REC" button (one touch recording method).

### 1-7. Infrared-ray Wireless Remote Control

The infrared-ray wireless remote control with the operational distance of about 6 m and the angle of 25° (in case of no reflection). The power can also be turned ON and OFF. Indicator lamps are provided so that the battery condition and transmitting condition can be seen at a glance. VS-5 itself incorporates an indicator lamp to show the receiving condition, and it can be confirmed whether the signal from the remote control has been transmitted correctly to the unit. The remote control has an "SAFETY LOCK" Switch to prevent its misoperation.

### 1-8. Auto REW Operation

When picture recording or playing back is completed, the tape is automatically rewinded to the tape counter "0000" (when counter memory is pressed) or to starting end of the tape. This function is very convenient especially in timer recording because the machine is stopped only after the tape is rewinded to the start when the recording is completed to the end of the tape thus enabling the record to be played back soon.

### 1-9. AEC Operation (Automatic Editing Control)

The unit incorporates the AEC mechanism which prevents the picture disturbance at the joint between a cut and a cut. It prevents the disturbance by rewinding the tape at an equal speed for a fixed time (a fixed length) and playing it back thus putting the track arrangement in order between the cuts.

### 1-10. Accurate Counter

If the tape passes the point of "0000" in FF or REW, the tape is forwarded or reversed a little to stop at the counter indication "0000".

When the tape is not loaded, the counter cannot be reset.

### 1-11. 4 Motors Mechanism

To stabilize the operation an independent motor is provided for each mechanism.

1) Head Motor (Quartz Direct Drive Method)
2) Capstan Motor
3) Loading Motor
4) Reel Motor

### 1-12. 3 Micro-processors

By using separate micro-processors, the complicated circuit are controlled comparatively simply.

1) Micro-processor for mechanism control
2) Micro-processor for tuner control
3) Micro-processor for timer control

Especially the memory in the timer and tuner circuits is backed up by the built-in rechargeable batteries, and when a power failure is detected, all the data stored in the timer and tuner are stored in the memory.

The unit has a program to check itself when the power is turned "ON", and if any abnormality is found, it issues the buzzer alarm and indicates "breakdown" on the FLD.

### 1-13. Breakdown Mechanism

When the self-checking mechanism finds a breakdown or the operation of the mechanism fails, the buzzer is sounded and the breakdown is indicated on the FLD. Also the breakdown turns the power OFF and makes all the operations disable. When the cause is removed, it can be reset by the OFF → ON operation of the main power.

### 1-14. Channel Set OSC

The unit incorporates an oscillator for channel setting so that the RF converter can be set swiftly and accurately in an empty channel of the TV.

### 1-15. Input Automatic Switching

When the video signal is inputted in EXTERNAL VIDEO IN TERMINAL, EXT. IN mode is automatically obtained.

## 2. SERVO CIRCUIT

### 2-1. Outline of Servo Circuit

The servo circuit of VS-5 uses the capstan servo system.

Therefore, for the tracking control when playing back, the drum motor is driven at a fixed phase and the C.T.L. phase is matched by controlling the speed of the capstan motor. The relationship between the reference signal and comparison signals of various modes is shown in Fig. 8.

| | HEAD MOTOR | | CAPSTAN MOTOR | |
|---|---|---|---|---|
| | REFERENCE | COMPARISON | REFERENCE | COMPARISON |
| REC | INPUT VIDEO<br>V Sync | P.G. | INPUT VIDEO<br>V Sync/2 | $\frac{\text{C-FG}}{16}$ |
| PB | * X'tal | P.G. | * X'tal | CTL |
| X9 PB | X'tal | P.G. | Drum P.G. | $\frac{\text{CTL}}{9}$ |

(* In AEC, the reference signal of PB is the input video V sync.)

Fig. 8

## 2-2. Drum Servo Circuit

### 2-2-1. Rec Mode

1) Phase Control

For the reference signal when recording, V-Sync is used which is the input signal separated through the Sync separator of the video circuit.

This signal is inputted in IC1 ㉗ and separated into two systems within the IC, and one signal is 1/2 counted down through MM, outputted from Pin ⑥ through CTL REC AMP, and supplied to C.T.L. Head through Terminal ②. Another signal is added as a trigger signal to the trapezoid wave form generator within the IC1 through FF.

The comparison signal generated by the P.G Head is level adjusted by VR1 and supplied to Pin ㉔. Then, the signal is separated into two and added to Mono – Multi, where the phase of the switching pulse is adjusted (VR3, VR4) and they are outputted from Pin ⑳. A part of the above Mono-Multi output is again added to MM3 through the Gate. Here the switching point in recording is determined by the time constant by VR2 and C12. Then the output signal passes the gate and is added to S/H circuit (sample & Hold) as a sampling pulse. On the other hand, the trapezoidal wave produced by the trapezoidal wave form generator is also added to the S/H circuit and sampled by the above sampling pulse, and the output is stored in the hold circuit. (C14). The signal sampled and held is outputted from Pin ⑮, and then, the phase control signal is added to the speed control circuit through R17 and R21.

2) Speed Control

The output from DM-FG is amplified by IC5 1/2 and added to IC1 ⑭, and the input is added to the speed control MM within the IC5 as a trigger signal. The time constant of the speed Mono-Multi is determined by VR6, R23 and C16 because the IC2 electronic switches Pins ⑨ and ⑧ are energized in Rec mode. The output is taken out of Pin ⑧ and added to IC5 (1/2) Pin ⑥, and the output is taken out of Pin ⑦ and added D.M. control circuit through Terminal ③.

### 2-2-2. Play Back Mode

1) Phase Control Circuit

For the reference signal in PB mode, the signal generated by the X'tal OSC of Y/C PCB is used after being counted down to 50 Hz, as shown in Fig. 8. Others are exactly same as for recording mode.

2) Speed Control Circuit

a) Normal Speed Play Back

Exactly same operation as for recording.

b) Cue or Review

The relative speed of the video head and the tape in CUE (X9 forward play) is reduced by about 4% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are the same.

How the video head traces the pattern on the tape is shown in Fig. 9. On the other hand, the relative speed of the video head and the tape in REVIEW (X9 reverse play) is reduced by about 4.06% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are opposite. As aforementioned, since $f_H$ and $f_V$ change in CUE and REVIEW thus making the synchronization of the TV picture unavailable, the stable picture will not be obtained on the TV screen.

To prevent this and to make $f_H$ (horizontal frequency) of the playback video signal normal, the speed of the drum motor is changed.

$f_V$ (vertical frequency) also changes but it will pose no problem because the vertical synchronization range of TV is wide.

* Reference:

○ Reduction of relative speed in CUE mode

$$\frac{-(1 + 9) \times 23.39}{(25 \times 62 \times 3.14) - 23.39} \times 100 = 4.82\%$$

○ Increase of relative speed in REVIEW mode

$$\frac{(-1 + 9) \times 23.39}{(25 \times 62 \times 3.14) - 23.39} \times 100 = 3.86\%$$

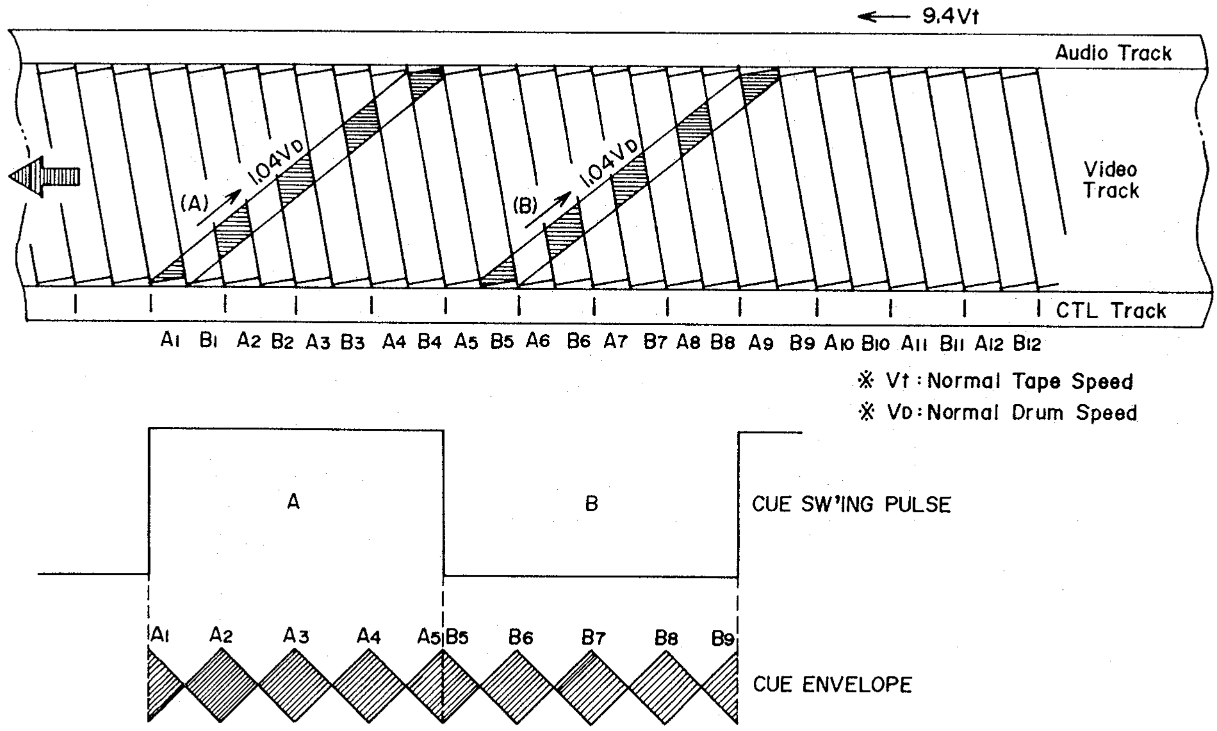
The output in each mode of IC3 is shown in Fig. 10.

c) CUE Mode

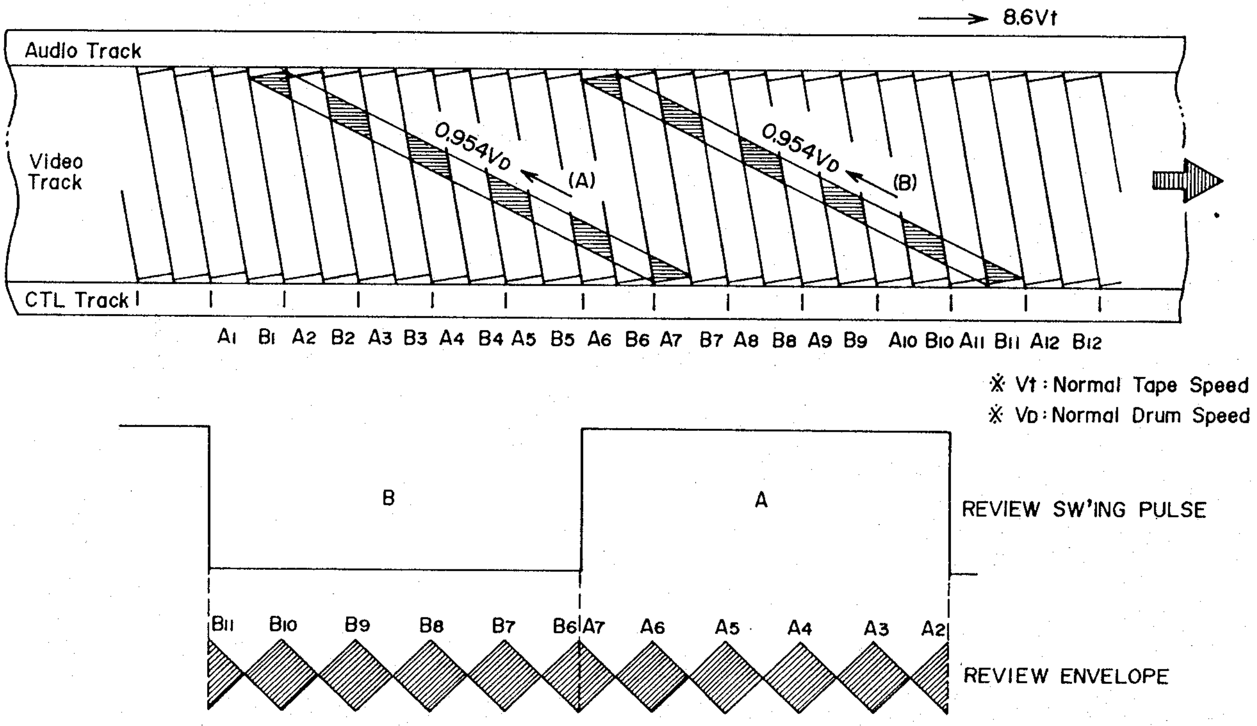
In CUE mode, IC3 ⑪ → 'H' → IC2 ⑫ → 'H' → IC2 ⑪ – ⑪ → ON as shown in Fig. 10, and the time constant of the speed control MM within IC1 is determined by VR5, R22 and C16, and the speed of the head motor is increased by the reduction (4.82%) of the relative speed of CUE mode described above.

d) REVIEW mode

In REVIEW mode, IC3 ⑩ → 'H' → IC2 ⑬ → 'H' → IC2 ① – ② → ON as shown in Fig. 10, and the time constant of the speed control within IC1 is determined by VR7, R24 and C16, and the speed of the head motor is reduced by the increase (3.86%) of the relative speed of REVIEW mode described above.

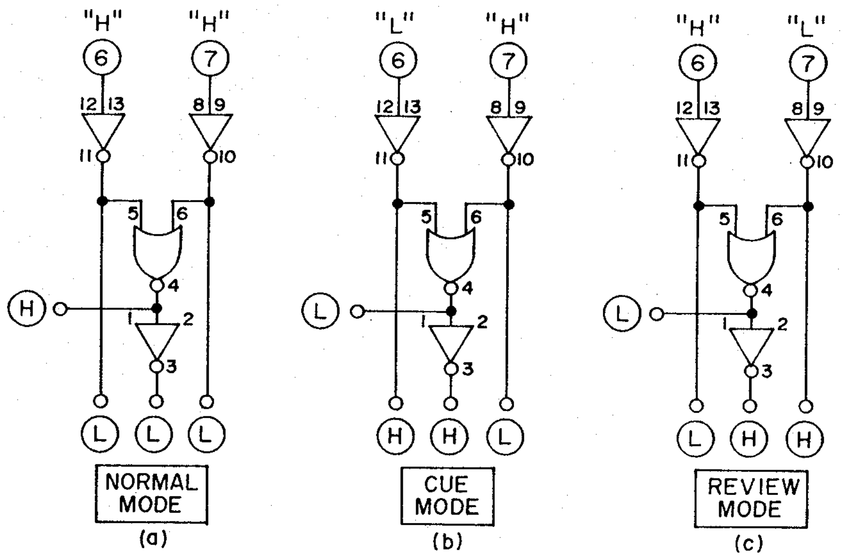

← 9.4Vt
Audio Track
Video Track
CTL Track
(A)
1.04VD
(B)
1.04VD
A1 B1 A2 B2 A3 B3 A4 B4 A5 B5 A6 B6 A7 B7 A8 B8 A9 B9 A10 B10 A11 B11 A12 B12
※ Vt : Normal Tape Speed
※ VD : Normal Drum Speed
A
B
CUE SW'ING PULSE
A1 A2 A3 A4 A5 B5 B6 B7 B8 B9
CUE ENVELOPE

(a) CUE MODE


→ 8.6Vt
Audio Track
Video Track
CTL Track
0.954VD
(A)
0.954VD
(B)
A1 B1 A2 B2 A3 B3 A4 B4 A5 B5 A6 B6 A7 B7 A8 B8 A9 B9 A10 B10 A11 B11 A12 B12
※ Vt : Normal Tape Speed
※ VD : Normal Drum Speed
B
A
REVIEW SW'ING PULSE
B11 B10 B9 B8 B7 B6 A7 A6 A5 A4 A3 A2
REVIEW ENVELOPE

(b) REVIEW MODE

Fig. 9


"H"
"H"
⑥
⑦
12
13
8
9
11
10
5
6
4
1
2
3
Ⓗ
Ⓛ Ⓛ Ⓛ
"L"
"H"
Ⓛ
Ⓗ Ⓗ Ⓛ
"H"
"L"
Ⓛ
Ⓛ Ⓗ Ⓗ

NORMAL MODE (a)

CUE MODE (b)

REVIEW MODE (c)

Fig. 10

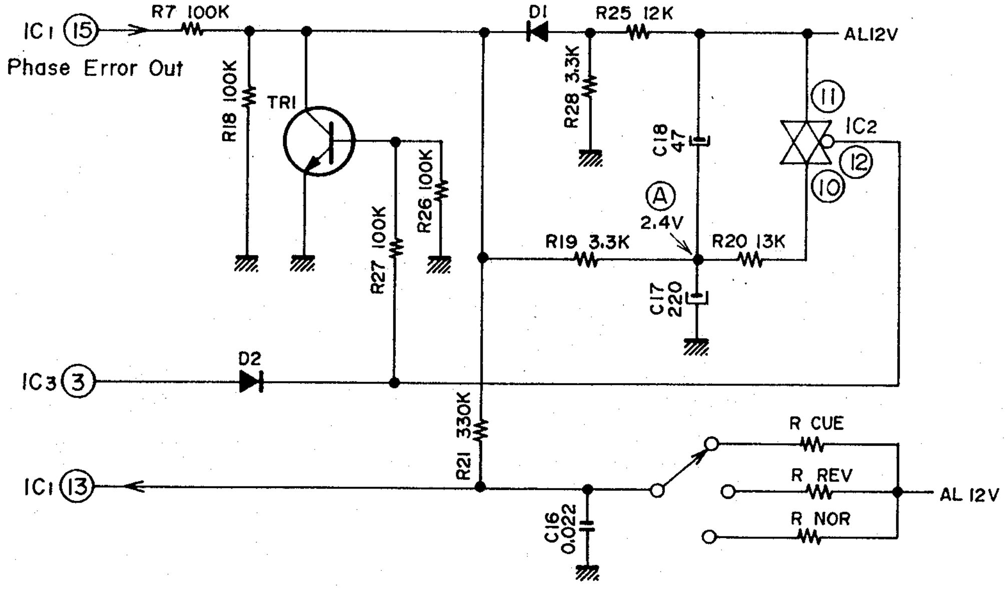

IC1 ⑮
R7 100K
Phase Error Out
R18 100K
TR1
R27 100K
R26 100K
D1
R25 12K
R28 3.3K
C18 47
AL12V
⑪
IC2
⑫
⑩
Ⓐ
2.4V
R19 3.3K
R20 13K
C17 220
IC3 ③
D2
R21 330K
IC1 ⑬
C16 0.022
R CUE
R REV
R NOR
AL 12V

Fig. 11

3) Additional Circuit for Drum Motor Speed Control
Since the drum motor phase control is not required in SPEED mode, it is eliminated by turning TR1 ON.

IC3 ③ → 'H' → TR1 → ON → Phase Error Out → GND
→ R19 → GND
→ IC2 ⑫ → 'H' → IC2 ⑩ – ⑪ → ON → R20 → AL12V
→ C17 → charged to the voltage determined by R19, R20.

The circuit shown in Fig. 11 is intended to return the speed of the head motor to the steady rotation immediately when the mode is returned from SPEED to NORMAL, and it adds the potential given to C17 in SPEED play immediately to the speed control circuit in NORMAL mode instead of the phase error. To improve the rising from the power ON, C18 is inserted, and immediately when AC12V is supplied, this charges the potential at A point (Fig. 11) to the value of steady state (potential near to DC + 2.4V).

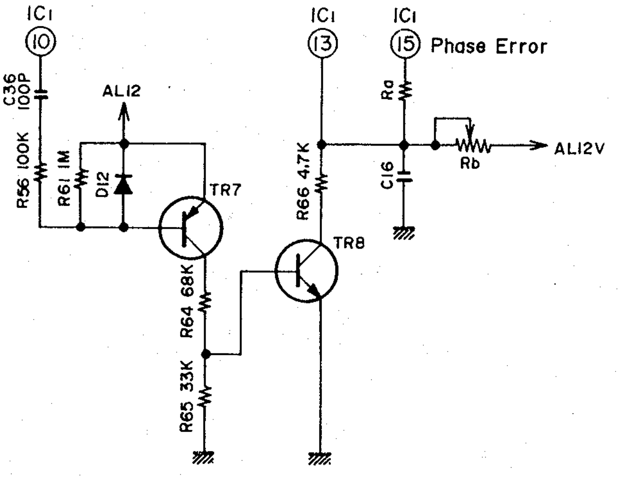

IC1
⑩
C36 100P
AL12
R56 100K
R61 1M
D12
TR7
R64 68K
R65 33K
IC1
⑬
R66 4.7K
TR8
IC1
⑮ Phase Error
Ra
C16
Rb
AL12V

Fig. 12

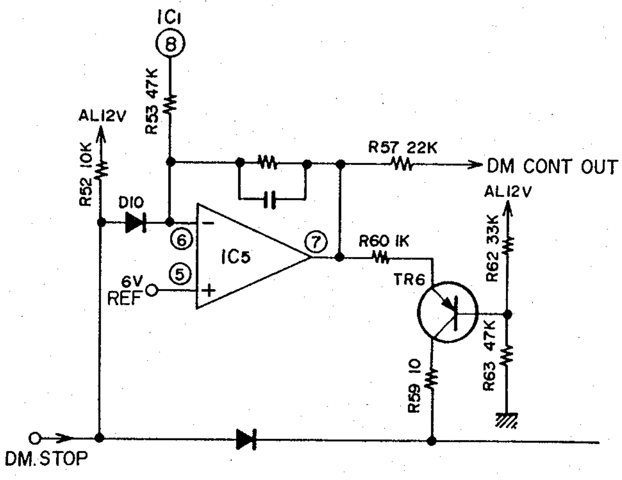

IC1
⑧
R53 47K
AL12V
R52 10K
D10
⑥
⑤
6V REF
IC5
⑦
R57 22K
DM CONT OUT
AL12V
R60 1K
TR6
R62 33K
R63 47K
R59 10
DM.STOP

Fig. 13

The circuit shown in Fig. 12 is intended to prevent the Drum motor from being locked at double speed, and when it is being locked at double speed, IC1 ⑩ becomes 'L', TR7 ON, TR8 ON, and IC1 ⑬ is grounded by R66 to prevent the locking.

When DM starts,

IC1 8 → L → IC5 7 → H → TR6 → ON ┬→ TR1 → ON
└→ IC2 ⑫ → H → IC2 ⑩ – ⑪ → ON,

and it charges the alternate voltage for phase control to C17 and makes the phase control easier when the DM speed becomes constant.
(Same operation as for CUE/REVIEW)

## 2-3. Capstan Servo Circuit

### 2-3-1. Rec Mode

1) Speed Control Circuit
The capstan motor has FG. FG output is 500 rpm, 3,600 Hz.
The FG output of the capstan motor is amplified by TR5 and added to IC4 ⑯. The signal passes FG amplifier → FF1 → FF2 within the IC4 and is added to MM2. The time constant of MM2 is determined by C27, VR8 and R67. This is because the Rec mode forces normal speed as shown in Fig. 10, IC3 ④ → 'H' → IC8 ⑨, ⑩, ⑪ → H, and the electronic SW of IC8 is at the normal side, and VR8 and R67 are selected. Then, the signal passes the gate and makes the trapezoidal wave. (delayed signal).
The trapezoidal slope will be IC3 ③ → L → TR10 → OFF when normal, and is determined by R74 and R75. On the other hand, the signal from FF2 passes the inverter, and together with the signal from MM2, triggers FF3 and uses the output as a sampling pulse (current signal) to sample the trapezoidal wave previously made. The output is held in the hold circuit and outputted from IC4 ⑦, and the output is added to TR11 through the clamping circuit consisting of D14, R80 and R81, and the output is amplified about 30 dB by TR11 and taken out of P33 ④ as the capstan motor control output.
The signal from the phase control circuit is added to IC4 ③ and mixed with the speed control signal. Actually the apparent time constant is changed by adding the DC voltage of phase error to the circuit of IC4 MM2. (Fig. 14)

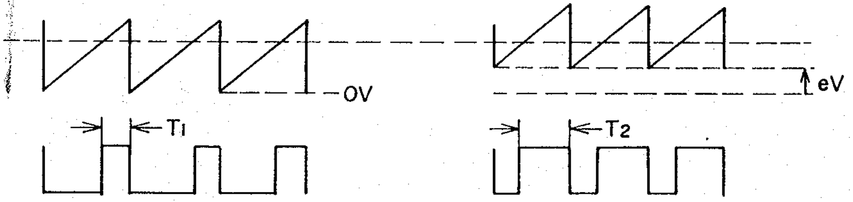


Fig. 14

2) Phase Control

The reference signal when recording is input V sync. The composite sync inputted into IC1 ㉖, after passing $V_{SS}$ and FF within IC1, is outputted from IC1 ⑱ as V-pulse. As seen from the normal mode in Fig. 10, IC3 ④ → 'H' → IC6 ⑤ → 'H' → IC6 ③ – ④ → ON, and the signal is added to TR2. Passing the emitter follower of TR2, it is inputted from IC4 ⑬ to make the reference trapezoidal wave. In the case of comparison signal, the signal $\frac{400\text{ Hz}}{2}$ obtainable from IC4 ⑤ of the capstan motor FG circuit is amplified and inputted into the electronic SW IC8 ③, and the output can be obtained from IC8 ④ because of normal mode, and the output is inputted in the 1/8 countdown circuit IC7 ①. The output is taken out of IC7 ⑨ as 25 Hz. This is differentiated by R100 and C41, wave formed by TR15 and inputted to IC1 ③. In REC mode, the output is obtained from IC1 ② and it is again inputted into the electronic SW IC8 ① and taken out of IC8 ⑮. This is inputted into IC4 ⑮ and passed through the PG amplifier within the IC4 → MM1 → gate, and the sampling pulse as a comparison signal is obtained. In REC mode, J104 ② → L → TR3 → ON, so the time constant of MM1 is determined by R32, R11, R43 and C26.

The trapezoidal pulse (produced from input V sync), reference signal, is sampled by the sampling pulse ( $\frac{400}{2} \times \frac{1}{8} = 25$ Hz), comparison signal, and is added to the speed control circuit of IC4 ③ through the hold circuit.

### 2-3-2. Normal PB Mode

1) Phase Control Circuit

The comparison signal of the phase control circuit is obtained from CTL head. The output of CTL head is inputted into IC1 ⑥. In PB mode, the CTL REC amplifier of IC1 is turned OFF, and the CTL amplifier output within the IC passes the electronic SW within the IC and is outputted from IC1 ②. In NORMAL mode, IC8 ① is selected and the output is made from IC8 ⑮. This is inputted into IC4 ⑮ and it passed through PG amplifier → MM1 → gate, and samples the reference signal as the sampling pulse. Here the tracking is controlled by MM1.

In PB,

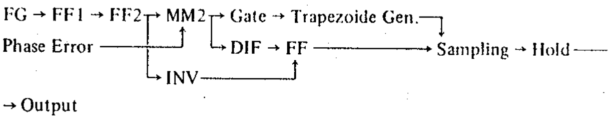
J104 ② → H → TR3 → OFF so the time constant of MM1 is determined
→ D7 → ON,

by EXT. VR, VR11, R43 and C26.

In the case of reference signal, the X'tal oscillator signal counted down to 50 Hz obtainable from the signal circuit as well as the drum motor circuit is inputted into IC1 ㉖ and 1/2 counted down to obtain 1/2V pulse from IC1 ⑱. This V pulse is inputted into IC4 ⑬ via IC6 electronic SW and TR2 to make the trapezoidal pulse, the reference signal within the IC4. This reference signal is sampled by the comparison signal (produced from CTL) previously made and is outputted from IC4 ⑨, and then it is inputted into the speed control circuit IC4 ③.

2) Speed Control Circuit

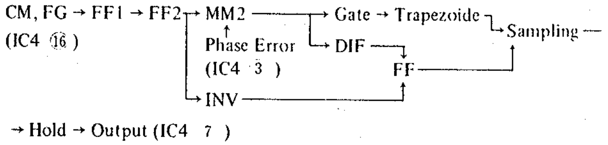
As in REC mode, from the signal from C.M. FG, the output is obtained within the IC4 by the following operation.



### 2-3-3. Speed Play Mode [in this mode, all the IC8 (electronic SWs) are at SPEED side]

1) Speed Control Circuit

In SPEED PLAY mode, the only difference in operation between CUE mode and REVIEW mode is that the time constant of MM2 within the IC4 for the speed control circuit is changed, and this part only will be described below. The signal from CM, FG is processed within the IC4 as follows to output the CM control signal.



a) CUE Mode

IC3 ⑪ → 'H' → IC6 ⑥ → 'H' → IC6 ⑧ – ⑨ → ON, so the time constant of MM2 is determined by VR10, R68 and C27.

Time constant for stable rotation at 9-fold speed.

b) REVIEW

IC3 ⑩ → 'H' → IC6 ⑫ → 'H' → IC6 ⑧ – ⑨ → ON, so the time constant of MM2 is determined by VR9, R69 and C27.

Time constant for stable rotation at 9-fold speed.

In SPEED mode, J104 ⑨ $\overline{X2}$ → L → IC4 ② → L → FF2 → operaton, so every other comparison signal is compared by the Mono-Multi time constant circuit designed so as to achieve stability usually at a set speed, and the speed system usually works to meet the speed logic, and as a result, the motor is driven at double speed. To achieve the rotation at 9-fold speed, the drive voltage of the CM drive circuit is made 30V instead of usual 17V. This switching is made by the power circuit.

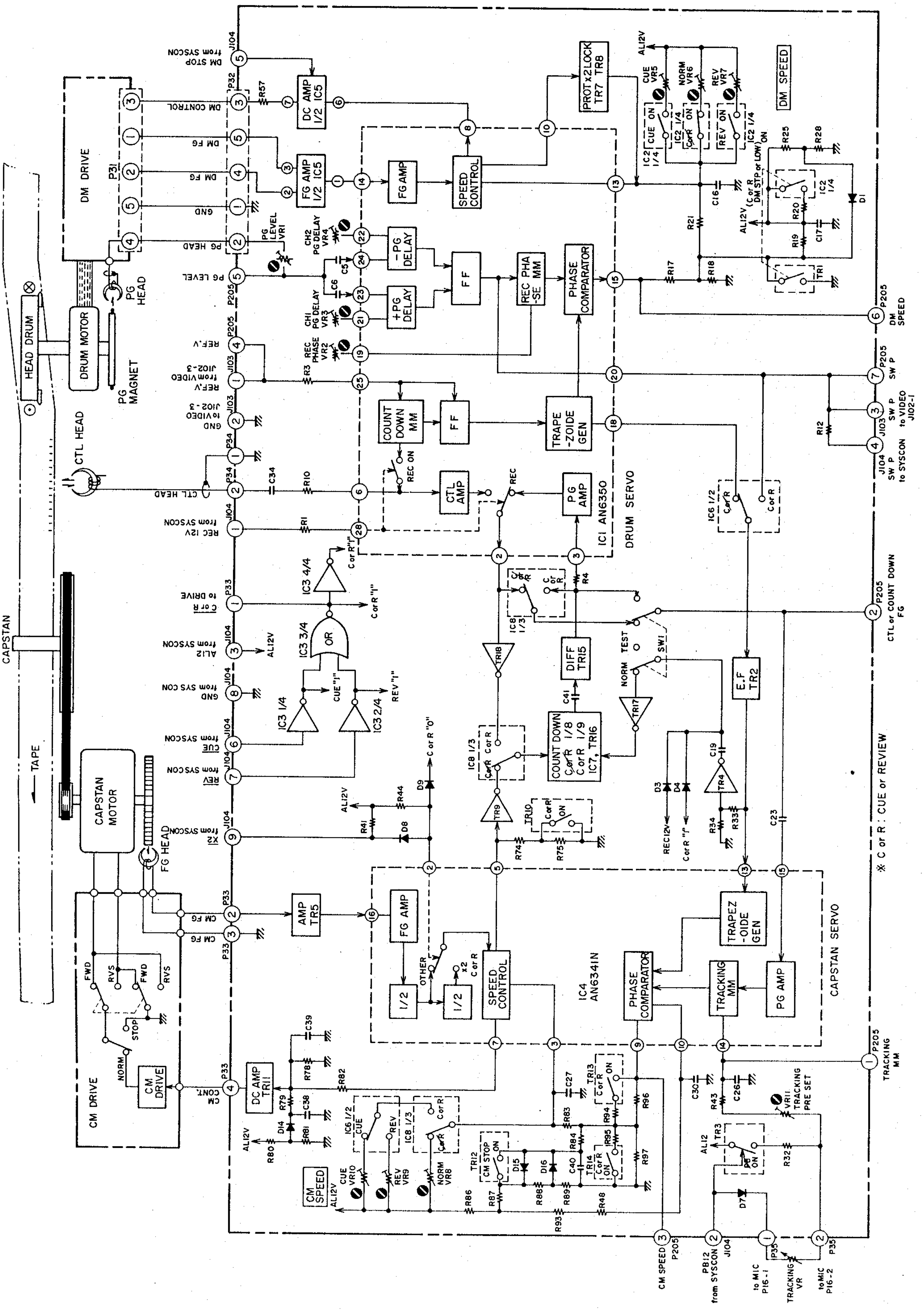

HEAD DRUM
DRUM MOTOR
PG MAGNET
PG HEAD
DM DRIVE
P31
CTL HEAD
CAPSTAN
TAPE
CAPSTAN MOTOR
FG HEAD
CM DRIVE
FWD
RVS
STOP
NORM
DM STOP from SYSCON
DM CONTROL
DM FG
GND
PG LEVEL
PG LEVEL VR1
REF.V
REF.V from VIDEO J102-3
GND to VIDEO J102-3
CTL HEAD
REC 12V from SYSCON
C or R to DRIVE
AL12 from SYSCON
AL12V
GND from SYS CON
CUE from SYSCON
REV from SYSCON
X2 from SYSCON
CM FG
CM CONT.
DC AMP 1/2 IC5
FG AMP 1/2 IC5
FG AMP
SPEED CONTROL
PROT x2 LOCK TR7 TR8
-PG DELAY
+PG DELAY
CH2 PG DELAY VR4
CH1 PG DELAY VR3
REC PHASE VR2
FF
REC PHASE MM
PHASE COMPARATOR
COUNT DOWN MM
TRAPE-ZOIDE GEN
CTL AMP
PG AMP
REC ON
REC
IC1 AN6350
DRUM SERVO
CUE VR5
NORM VR6
REV VR7
IC2 1/4
CUE ON
C or R ON
REV ON
DM STP or LOW
DM SPEED
TR1
D1
P205 DM SPEED
P205 SW P
SW P to VIDEO J102-1
J104 SW P to SYSCON
IC6 1/2
C or R
P205 CTL or COUNT DOWN FG
IC3 4/4
IC3 3/4
OR
IC3 1/4
IC3 2/4
CUE "1"
REV "1"
C or R "1"
C or R "0"
IC8 1/3
TR18
DIFF TR15
COUNT DOWN C or R 1/8 C or R 1/9 IC7, TR16
NORM TEST SW1
TR17
E.F TR2
TR4
TR9
TR10
REC12V
C or R "1"
※ C or R : CUE or REVIEW
AMP TR5
FG AMP
1/2
OTHER
x2 C or R
SPEED CONTROL
IC4 AN6341N
PHASE COMPARATOR
TRACKING MM
PG AMP
TRAPEZ-OIDE GEN
CAPSTAN SERVO
P205 TRACKING MM
DC AMP TR11
IC6 1/2
IC8 1/3
CUE
REV
CM STOP ON
TR12
TR13
TR14
CM SPEED
CUE VR10
REV VR9
NORM VR8
VR11 TRACKING PRE SET
TR3
PB ON
CM SPEED P205
PB12 from SYSCON J104
to MIC P16-1
TRACKING VR
to MIC P16-2

Fig. 15 SERVO BLOCK DIAGRAM

2) Phase Control Circuit

In SPEED PLAY, the phase control can match the phase of the video head with that of CTL by using as a reference the PG pulse obtainable from the head motor which is rotating quartz locked at a constant speed. As a result, the noise bar is fixed and easy-to-see picture is obtained.

In SPEED PLAY mode, IC3 ③ → 'H' → IC6 ⑬ → 'H' → IC6 ① – ② → ON, so 25 Hz obtained by the drum PG head is passed through IC1 ⑳ to IC6 ① – ②, and added to TR2. The TR2 Emitter follower output is added to IC4 ⑬ and converted into the trapezoidal wave within the IC4 as a reference signal. As for the comparison signal, the CTL signal (25 Hz x 9 = 225 Hz) obtainable from CTL head is inputted into IC1 ⑥ and outputted from IC1 ②. This is inputted into IC8 ⑤ through TR18 (inverter) and outputted from IC8 ④ and then, inputted into IC7 ①. Since the IC7 operates as 1/9 counter in SPEED PLAY mode (operational principle will be described later), from IC7 ⑨, 25 Hz is obtained. This is differentiated by C41 and R100, waveform shaped by TR15 and inputted into IC4 ⑮ IC8 ② → IC8 ⑮. It becomes the sampling pulse as a comparison signal by passing through PG → MM1 gate within the IC4. Here the reference signal (trapezoidal) produced from the drum PG is sampled by the comparison signal (sampling pulse) produced from the CTL and is outputted from IC4 ⑨ as a phase error.

3) 1/9 Count Down Circuit

In the circuit shown in Fig. 16, when NORMAL, Ⓐ is L, so D19 and D20 are cut off and TR16 is also cut off, therefore, no reset input from TR16, but when started, 1/2V sync is inputted and TR4 is turned ON by the first pulse after AL12 is added, and immediately when C19 is charged, TR17 is turned ON and the reset pulse is added to IC7 ②.

In SPEED, in Fig. 16, Ⓐ becomes 'H', and if there is no reset input when the 9th pulse of (IC7 ①) shown in the lower half of the Fig. 15 is inputted, then, Q1 → 'H', Q2 → 'L', Q3 → 'L', Q4 → 'H'. When both Q1 and Q4 become 'H', the potential at Ⓓ point becomes 'H', TR16 is turned ON, TR17 also ON, and the reset pulse is inputted into IC7 ②. Immediately when the reset pulse is inputted, Q1, Q2, Q3 and Q4 all become 'L'. With the reset point "0", the pulse is again counted. Therefore, the pulse of IC7 ⑨ will be one pulse output against 9 pulse input, i.e. 1/9.

4) Phase Compensation Circuit and Limiter Circuit

The phase error signal coming from IC4 ⑨ is passed through the phase compensation circuit for stabilizing the system and added to the MM2 circuit of the speed control circuit to control the phase of the motor.

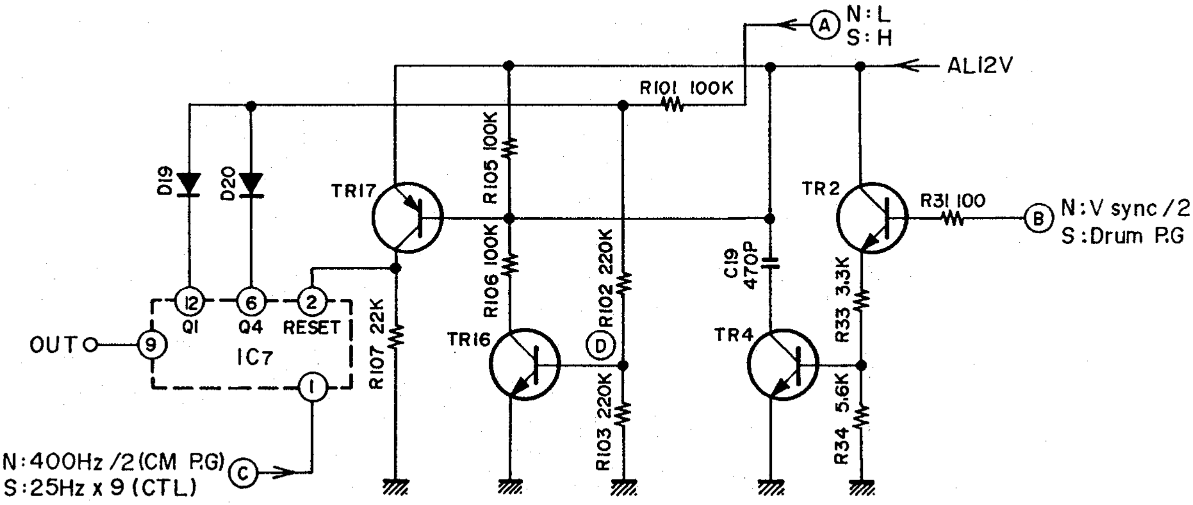


Fig. 16

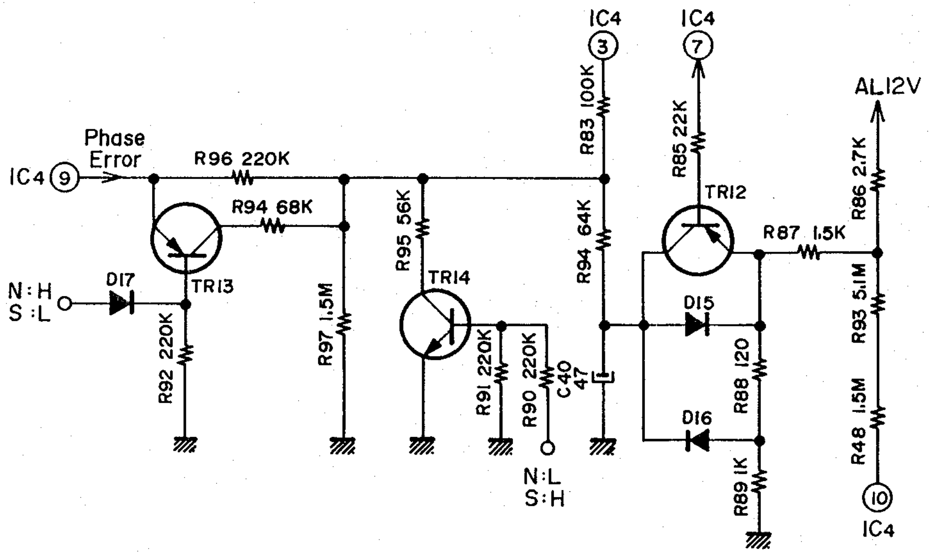

IC4 ③
IC4 ⑦
AL12V
Phase Error
IC4 ⑨
R96 220K
R94 68K
R83 100K
R85 22K
R86 2.7K
TR12
R87 1.5K
R95 56K
R94 64K
TR13
D17
N:H
S:L
R92 220K
R97 1.5M
TR14
R91 220K
R90 220K
C40 47
D15
R88 120
R93 5.1M
D16
R48 1.5M
N:L
S:H
R89 1K
⑩ IC4

Fig. 17

a) Normal Mode

TR13 → OFF, TR14 Base → 'H' → TR14 → OFF, and then as shown in Fig. 18. At this time, the voltage applied to the IC4 ③ is determined by R96 and R97. In other words, the voltage of R97 is added to IC4 ③. The specified number of rotation at this time is 500rpm.

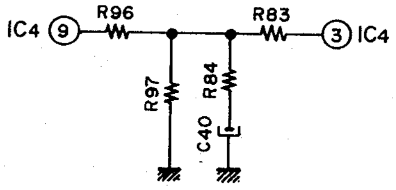

IC4 ⑨
R96
R83
③ IC4
R97
R84
C40

Fig. 18

b) Speed Play Mode

TR13 → ON, TR14 → ON, and then, as shown in Fig. 19. The voltage applied at this time is determined by R96//R94 and R95//R97. In other words, the voltage of R95//R97 is added to IC4. The specified number of rotation at this time is 4,500 rpm.

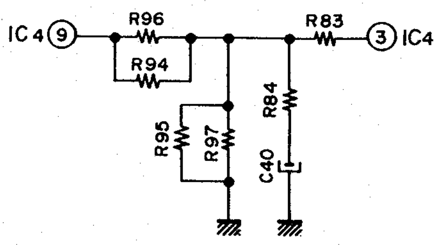

IC4 ⑨
R96
R94
R83
③ IC4
R95
R97
R84
C40

Fig. 19

c) Limiter Circuit

The charge-discharge time of C40 of the phase compensation circuit effects greatly the starting characteristic of the capstan motor. Therefore, the starting characteristic is improved by keeping the potential of C40 within the lock range of the phase control system and by shortening the charge-discharge time.

c-1) When motor starts:

IC4 ⑦ → L → TR12 → ON. Therefore, the voltage of C40 will be:

$$\frac{(R88 + R89) \times 12}{R86 + R87 + R88 + R89} \ (V)$$

Not passing to R96 and R94 (time constant is small, R96 + R94 ≫ R87 + R86), the power is charged instantly to the value near the specified voltage.

c-2) Normal rotation

TR12 is cut off and the voltage $E_C$ of C40 is kept within the following voltage range (servo lock range) and the limiter is applied to the phase error.

$$\frac{R89 \times 12}{Z} - 0.65 \leqq E_C \leqq \frac{(R88 + R89)}{Z}$$

$$\times 12 + 0.65$$

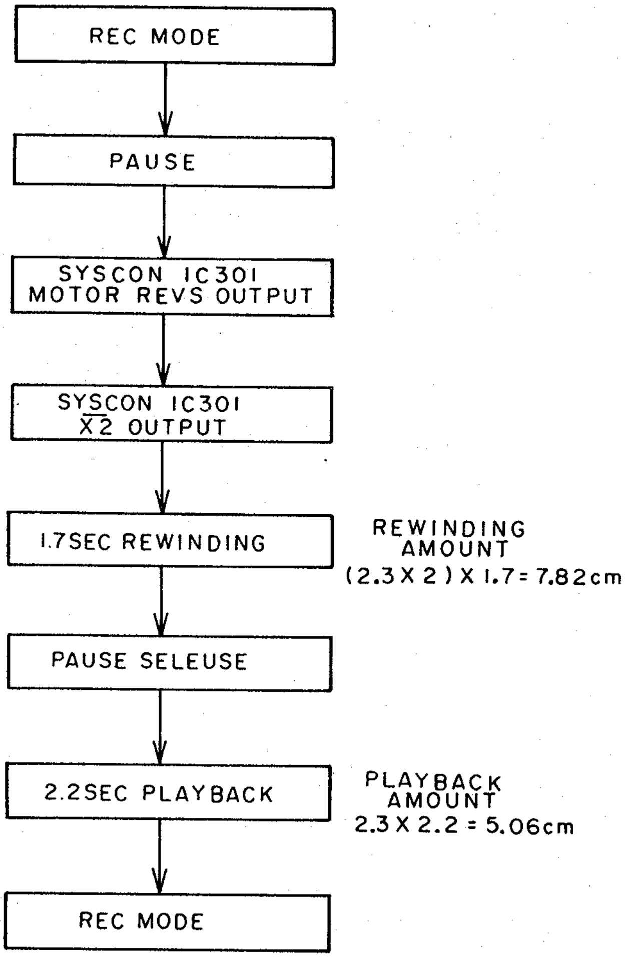

REC MODE
PAUSE
SYSCON IC301
MOTOR REVS OUTPUT
SYSCON IC301
$\overline{X2}$ OUTPUT
1.7SEC REWINDING
REWINDING AMOUNT
(2.3 X 2 ) X 1.7 = 7.82cm
PAUSE SELEUSE
2.2SEC PLAYBACK
PLAYBACK AMOUNT
2.3 X 2.2 = 5.06cm
REC MODE

Fig. 20

## 2-4. A. E. C. (Automatic Editing Control)

This is the circuit to prevent the disturbance of the picture at the joints between pictures. This occurs because the next picture recording is started independently of the recorded track pattern and the new and old track patterns and control signals becomes discontinuous (uneven). To solve this problem, VS-5, when the pause button is pressed during recording, rotates the capstan motor at double speed with the pinch roller compressed, and rewinds for a fixed time (about 1.7 sec.) and waits for the next recording.

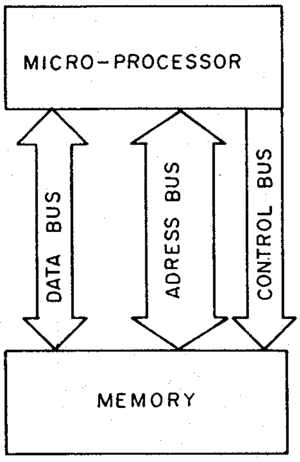
And when the pause is released, the playback mode is achieved (2.2 sec.) and after tracking, the recording is started. At this time, to prevent the occurrence of the phase disorder, the V. sync of input video signal is used as the servo reference signal when recording. (Fig. 8)

Motor reverse, $\overline{X2}$ (double speed) and rewinding time are all set by IC301 within the system control.

## 3. SYSTEM CONTROL AND TUNER & TIMER

System control circuit using two microprocessors carries out the control of tuner and timer system, and the control of system controls such as mode control, safety operation and warning operation. The memory of the tuner system is backed up for about one week by the built-in batteries when the power fails. For the principle of the microprocessors, refer to the special book. The principles are shown in Fig. 21.

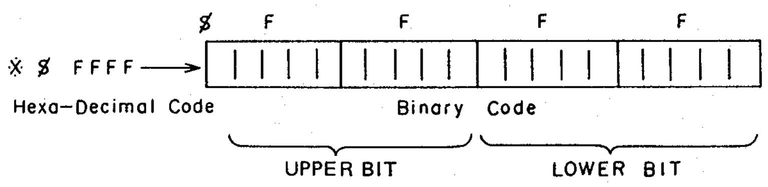
The output/input terminals of the microprocessors are shown in Fig. 22.

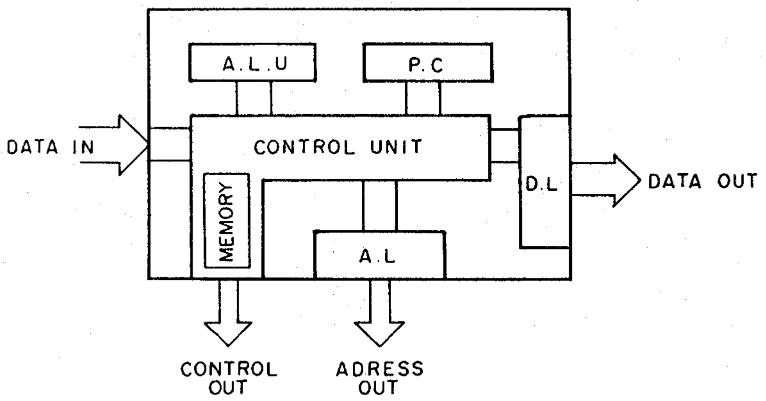

MICRO-PROCESSOR
DATA BUS
ADRESS BUS
CONTROL BUS
MEMORY

DATA BUS: WRITING & READING
* During Writing, Not Reading

ADDRESS BUS: RESERVING for Writing or Reading
($0000 ~ $FFFF)

CONTROL BUS: Commanding of Writing or Reading
for Memory


$ F F F F
※ $ FFFF
Hexa-Decimal Code
Binary Code
UPPER BIT
LOWER BIT


A.L.U
P.C
DATA IN
CONTROL UNIT
D.L
DATA OUT
MEMORY
A.L
CONTROL OUT
ADRESS OUT

(1) Fetch Cycle

① Read P.C # by Control Unit
② Set P.C Address on A.L by Control Unit
③ Send Address to Memory by Control Unit
④ Get Address Information by Control Unit
⑤ Store Information in Memory by Control Unit
8 Bits → P.C +3

(2) Execution Cycle

① Processing Memory Information in A.L.U by Control Unit
② Send Result to D.L by Control Unit
③ Store Data in Memory by Control Unit

ALU: Arithmatic Logic Control Unit
P.C : Program Counter
A.L : Address Latch
D.L : Data Latch

Fig. 21

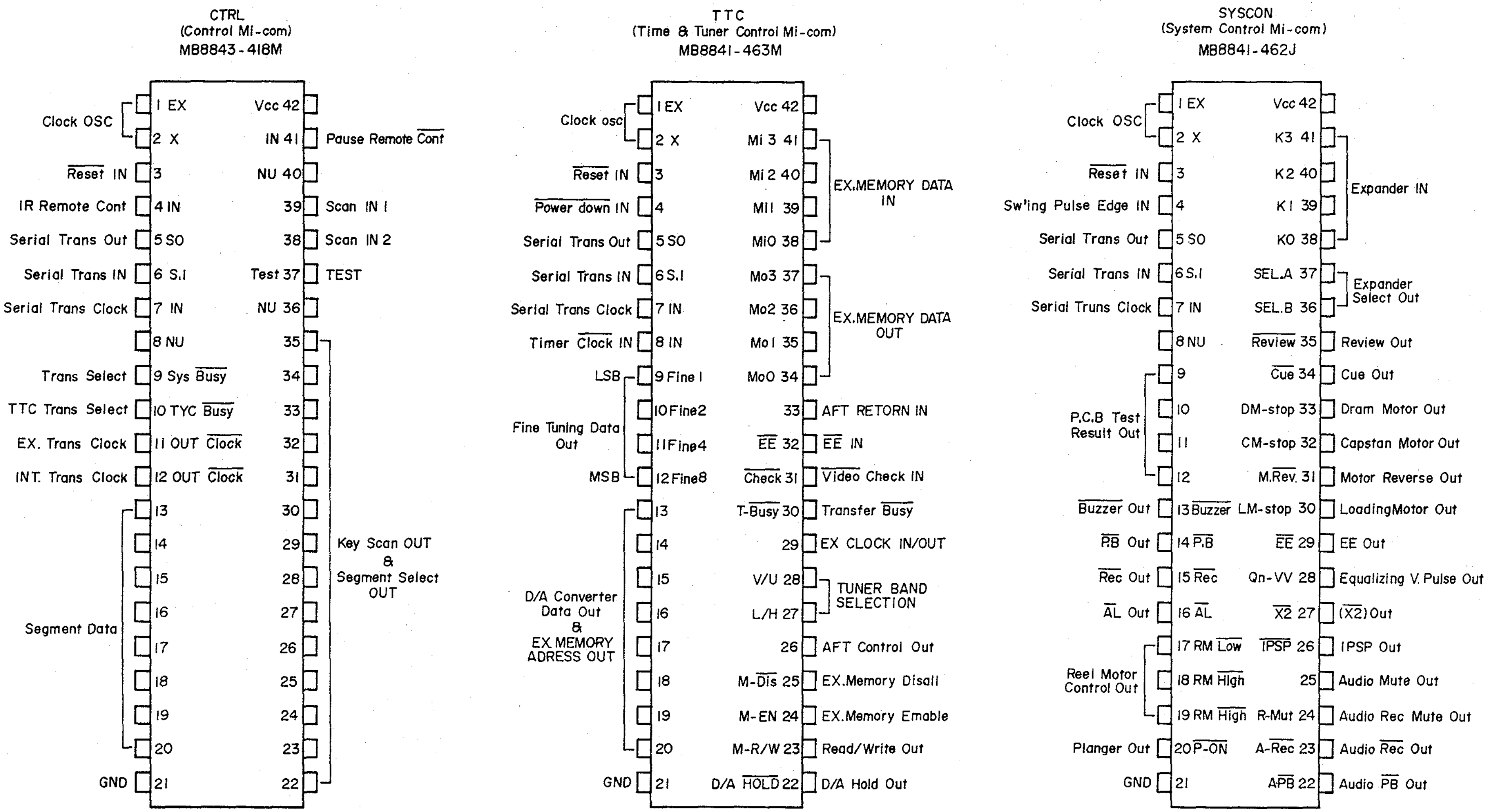

CTRL
(Control Mi-com)
MB8843-418M
Clock OSC
1 EX
2 X
Reset IN
3
IR Remote Cont
4 IN
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Trans Clock
7 IN
8 NU
Trans Select
9 Sys Busy
TTC Trans Select
10 TYC Busy
EX. Trans Clock
11 OUT Clock
INT. Trans Clock
12 OUT Clock
13
14
15
16
17
18
19
20
Segment Data
GND
21
Vcc 42
IN 41
Pause Remote Cont
NU 40
39
Scan IN 1
38
Scan IN 2
Test 37
TEST
NU 36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
Key Scan OUT
&
Segment Select
OUT
TTC
(Time & Tuner Control Mi-com)
MB8841-463M
Clock osc
1 EX
2 X
Reset IN
3
Power down IN
4
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Trans Clock
7 IN
Timer Clock IN
8 IN
LSB
9 Fine 1
10 Fine2
11 Fine4
12 Fine8
MSB
Fine Tuning Data
Out
13
14
15
16
17
18
19
20
D/A Converter
Data Out
&
EX.MEMORY
ADRESS OUT
GND
21
Vcc 42
Mi 3 41
Mi 2 40
MI1 39
MI0 38
EX.MEMORY DATA
IN
Mo3 37
Mo2 36
Mo1 35
Mo0 34
EX.MEMORY DATA
OUT
33
AFT RETORN IN
EE 32
EE IN
Check 31
Video Check IN
T-Busy 30
Transfer Busy
29
EX CLOCK IN/OUT
V/U 28
L/H 27
TUNER BAND
SELECTION
26
AFT Control Out
M-Dis 25
EX.Memory Disall
M-EN 24
EX.Memory Emable
M-R/W 23
Read/Write Out
D/A HOLD 22
D/A Hold Out
SYSCON
(System Control Mi-com)
MB8841-462J
Clock OSC
1 EX
2 X
Reset IN
3
Sw'ing Pulse Edge IN
4
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Truns Clock
7 IN
8 NU
9
10
11
12
P.C.B Test
Result Out
Buzzer Out
13 Buzzer
PB Out
14 P.B
Rec Out
15 Rec
AL Out
16 AL
17 RM Low
18 RM High
19 RM High
Reel Motor
Control Out
Planger Out
20 P-ON
GND
21
Vcc 42
K3 41
K2 40
K1 39
K0 38
Expander IN
SEL.A 37
SEL.B 36
Expander
Select Out
Review 35
Review Out
Cue 34
Cue Out
DM-stop 33
Dram Motor Out
CM-stop 32
Capstan Motor Out
M.Rev. 31
Motor Reverse Out
LM-stop 30
LoadingMotor Out
EE 29
EE Out
Qn-VV 28
Equalizing V. Pulse Out
X2 27
(X2) Out
IPSP 26
IPSP Out
25
Audio Mute Out
R-Mut 24
Audio Rec Mute Out
A-Rec 23
Audio Rec Out
APB 22
Audio PB Out

Fig. 22

## 3-1. Tuner & Timer Control Circuit

For the tuning method of VS-5, the voltage controlled synthesizer method is used. In this method, the tuning voltage is converted into the digital amount and stored in the memory, and the digital amount of the channel selected is again cconverted into the tuning voltage by the D/A converter.

The approximate diagram is shown in Fig. 23. Also VS-5 incorporates a program in the IC307 which reads out the data of this digital memory when timer recording and carries out the timer recording. This IC307 and the circuits attached are called Tuner Timer Control Circuits hereinafter.

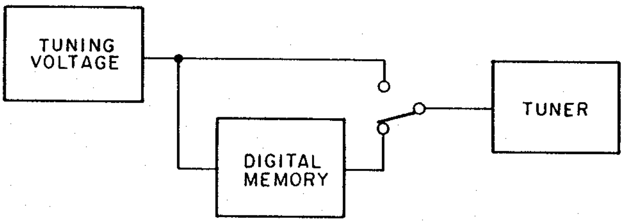
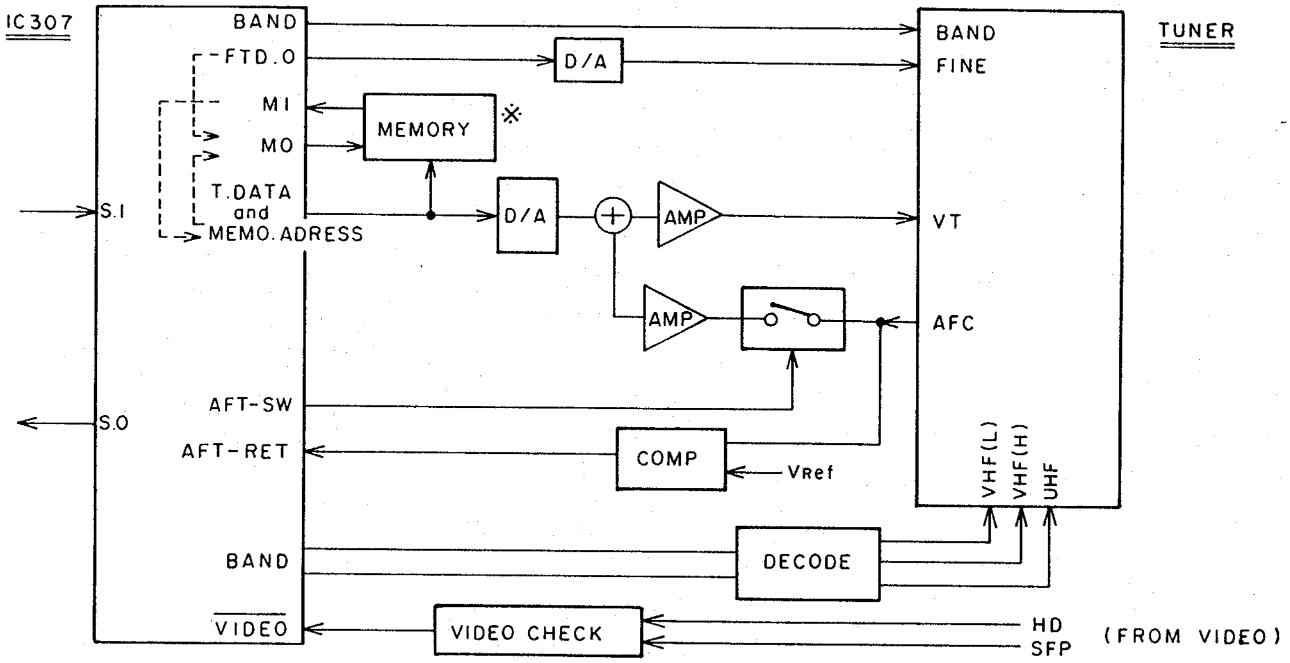


Fig. 23



※ Date in memory

Tuning Data 8bits
Bard Data 2bits
Fine Tuning Data 4bits
Flag Data 1bits
} Total 15bits

Fig. 24

### 3-1-1. Summary of Tuning

Fig. 24 is a block diagram of the tuning circuit. When any tuning commanding data enter the S.I. (Serial Input), IC307 outputs tuning data (VT: 8 bits) and band data (2 bits). The band data are directly supplied to the tuner, but the tuning data are converted into analogue voltage by the D/A converter and then supplied to the tuner. In the tuner, the tuning frequency is changed by this tuning voltage, and when a TV station is received, the voltage proportional to the tuning status is outputted to the AFC output of the tuner. This voltage is checked by the comparator and the exact tuning point is detected. If there is any deviation from the exact tuning point, the FINE tuning button is pressed to issue the fine tuning command to IC307 through the S.I. input. By this instruction, the fine tuning data (4 bits) are outputted from FTDO (Fine-Tuning Data Output), D/A converted, and inputted into the "FINE" of the Tuner.

If the "memorize" button is pressed when the tuning is completed, the address of the channel shown on the display is outputted from the Memory-Address Terminals, and the total 15 bits including tuning data (8 bits), fine data (4 bits), band data (2 bits) and flag data (1 bit) are stored in the same address as 4 words (16 bits).

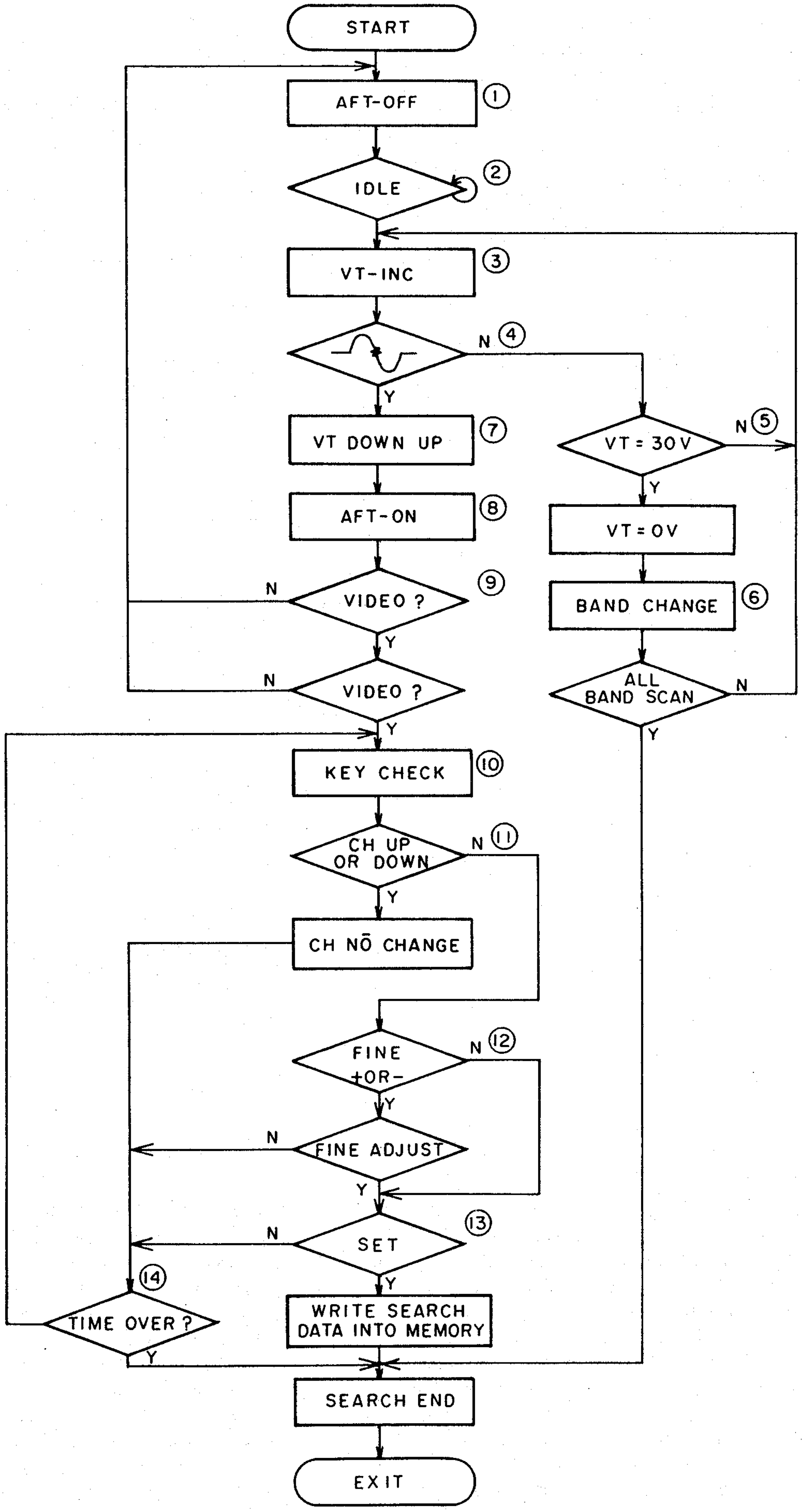

START
AFT-OFF ①
IDLE ②
VT-INC ③
N ④
Y
VT DOWN UP ⑦
VT = 30V
N ⑤
Y
AFT-ON ⑧
VT = 0V
N
VIDEO ? ⑨
BAND CHANGE ⑥
Y
N
VIDEO ?
ALL BAND SCAN
N
Y
Y
KEY CHECK ⑩
CH UP OR DOWN
N ⑪
Y
CH NŌ CHANGE
FINE +OR−
N ⑫
Y
N
FINE ADJUST
Y
N
SET ⑬
Y
⑭
TIME OVER ?
WRITE SEARCH DATA INTO MEMORY
Y
SEARCH END
EXIT

Fig. 25

### 3-1-2. TV-Search

The TV-Search is executed in accordance with the flow chart shown in Fig. 25. Each operation is described on basis of this flow chart.

1) If any AFT data exist, correct tuning is impossible, so the AFT circuit is turned OFF, and only the data from the microcomputer are supplied to the tuner. (IC307 ㉖ → 'L' → IC311 ⑫ → 'L' → IC311 ⑩ – ⑪ → OFF).
2) When the AFT SW is turned OFF, a change will occur in the AFC output of the tuner to change the AFT-Return Signal, and therefore, scanning is delayed for about 60 mS. (By the program within IC307).
3) Determination of intervals to increase VT. Depending on the band, they will change as shown in Fig. 26.

| | VHF (L) | VHF (H) | UHF |
|---|---|---|---|
| FAST | 60 mS | 60 mS | 60 mS |
| SLOW | 30 mS | 30 mS | 12 mS |

Fig. 26

Into the tuner, data are inputted depending on each mode by IC307 ㉘ and ㉗, and at the same time, 'H' is added when IC311 ⑤ is 'U', and IC311 ③ – ④ → ON.

4) When the tuner receives broadcast or noise, the waveform shown in Fig. 27 is outputted at AFC OUT. This AFC output is inputted in IC313 ⑥. This circuit is called AFC comparator and the operation is described by using Fig. 28.

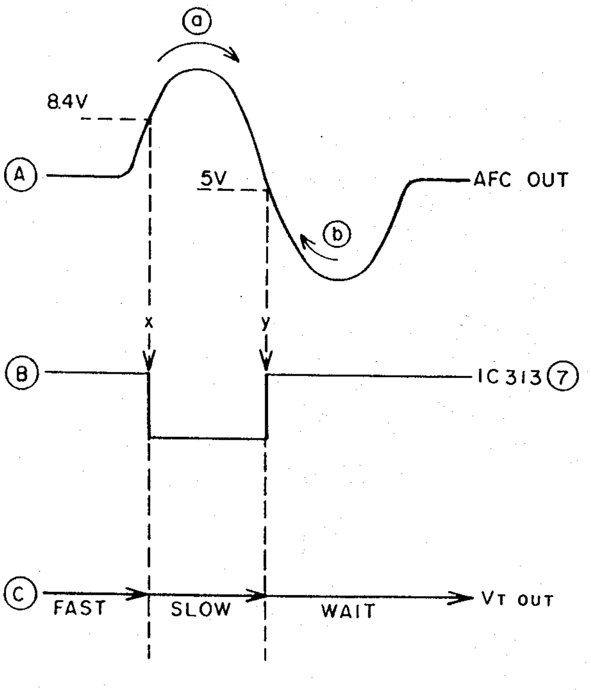


Fig. 27

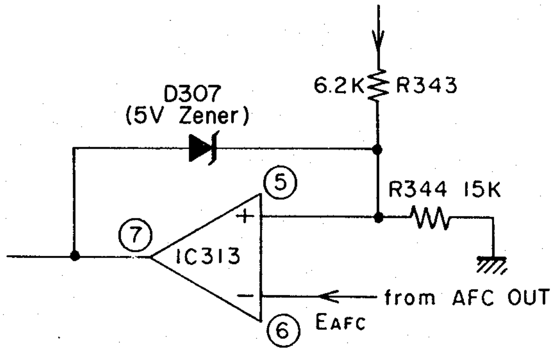


Fig. 28

If the voltage of AFC OUT of IC313 ⑥ is $E_{AFC}$, and when the tuner is not receiving a TV station, $E_{AFC}$ < IC313 ⑤ → IC313 ⑦ → H → D307 → OFF. At this time, the voltage of IC313 ⑤ is: $\frac{12}{R343 + R344} \times R344 = 8.4V$.

If the tuner receives a TV station and $E_{AFC} < 8.4V$, then IC313 ⑦ → 'L' → D307 → ON → IC313 ⑤ → 5V → VT → SLOW. And when the tuner passes the exact tuning point, $E_{AFC} < 5V$ → IC313 ⑦ → H → D307 → OFF → VT → WAIT.

5) For the VT, the tuner requires the change of 0 ~ 30V and the microcomputer output is 8 bits.

Therefore, one-STEP is $\frac{30V}{256} = 117\ mV \fallingdotseq 120\ mV$.

One-STEP change means in frequency:

VHF (Low) : 0.16 MHz
VHF (High) : 0.25 MHz
UHF : 1.68 MHz (all average) .

8 bits output from microcomputers ⑬ ~ ⑳ is inputted into IC309 D-A converter IC309 ⑤ ~ ⑫, taken out of IC309 ④ as analogue current output, converted into analogue voltage by IC310, and CR302 and added to Analogue SW IC311 ①. On the other hand, IC307 ㉒ → 'L' → TR310 → ON → IC311 ⑥ → H → IC311 ⑧ – ⑨ → ON → C306 (terminal voltage) is passed through R351 (When UHF, ON between TC311 ③ and ④, so directly), added to IC312 ⑥, inverted by IC312 and added to IC310 ②. This terminal voltage of C306 will be the reference voltage in tuning. (This reference voltage is a little higher than the flat portion of Fig. 27, and the reason is that it can be drawn sufficiently even when it enters the ⓑ part).

Therefore, when AFT-ON, if the voltage of AFC OUT is higher (or lower) than the reference voltage, any malfunction due to disturbance such as the temperature change of the tuner is prevented by lowering (or increasing) the voltage by the difference.

6) The band is scanned in the order of VHF (low) → VHF (high) → UHF, and the VT at the search start will be the voltage previously set.

When neither broadcast nor noise is received, 4 bands including the band at start are scanned. The band scanning signal is outputted by the microcomputer IC307 ㉘ and ㉗.

7) IC313 ⑦ changes at the exact tuning point or near to it as shown by y point of Fig. 27 Ⓑ. The VT changes slowly because it passes the differentiation circuit after IC309 (DA converter). Therefore, the scanning is finished at a point beyond the best tuning point. Here, after one step down, the exact tuning point is checked by the program incorporated within the microcomputer IC307. If the exact tuning point is the place where one step is returned, it is kept as it is, but if different, one step is returned to the original place. After AFT is turned ON, video or noise is determined.

8) When the exact tuning point is confirmed by the above 7), microcomputer
   IC307 ㉖ → H → IC311 ⑫ → H →
   IC311 ⑩ – ⑪ → ON
   → TR310 → OFF → IC311 ⑥ → L
   → IC311 ⑧ – ⑨ → OFF
   and, AFT is in ON position.

9) AFT SW is turned ON to achieve the normal control status. (For the video check, see the following 10.)

10) About 500 ms after the AFT SW is turned ON, the video-check is made to determine whether the signal being received is video signal or noise, and if it is determined as video signal, another video-check is made after 60 msec. If the result is video signal (IC315 ③ → 'L') the search-end mode, and the searched data can be set. (The keys acceptable in the search-end mode are: FINE +, FINE –, SET, CH-UP, CH-DOWN). The operation of the video check circuit is as follows.
   The operation of the circuit is described by using Fig. 29.

In Fig. 29, SFP and HD are supplied from IC8 within the Video P.C Board, and SFP is $\frac{1}{160}$ of 160 fH oscillated by VCO (SYNC. FRONT PULSE) and outputted from IC8 ④, and HD is the input video signal sync-separated. The output terminal is IC8 ⑱. Therefore, when the video signal exists, HD and SFP are in fixed phase relationship, but in the case of noise, SFP is the one free oscillated by VCO, and VD receives the input of noise only.

Gates 3 and 4 are circuits to detect whether the HD phase (equivalent to sync phase) is in agreement with the phase of SFP.

When the video signal is correctly inputted into the video amplifier, 160 fH is locked by the input sync and has the same phase, and at that time, the output will be "L" at the point where the phases are in conformity as shown in Ⓐ. Since the time constant of the discharging direction of C324 of R366//D308 and C324 circuits is almost '0', Ⓖ is made 'L' by the pulse. In the case of noise, it is very rare that the phases of SFP and noise are in conformity and that Ⓐ becomes 'L', and the level is 'H'. Gate 2 and TR312 are the circuits to check that there is no noise in the part other than the sync. SFP is inverted by TR312, and the leading edge of waveform Ⓒ is delayed by dt by C325. Therefore, it becomes 'H' when it is in the oblique line part of the waveform Ⓒ. If there is video input, the phases of Ⓒ ' and HD are in agreement and Ⓕ keeps 'H', but in the case of noise, it becomes 'L' when noise is inputted. In C323, R365 (charging circuit) and C323, R369 (discharging circuit), R365 >> R364, so the level of Ⓓ is 'L' and output E is H. On the contrary, when there is video input, both Ⓑ and Ⓓ become 'H' and the output is 'L'. (See Fig. 30)

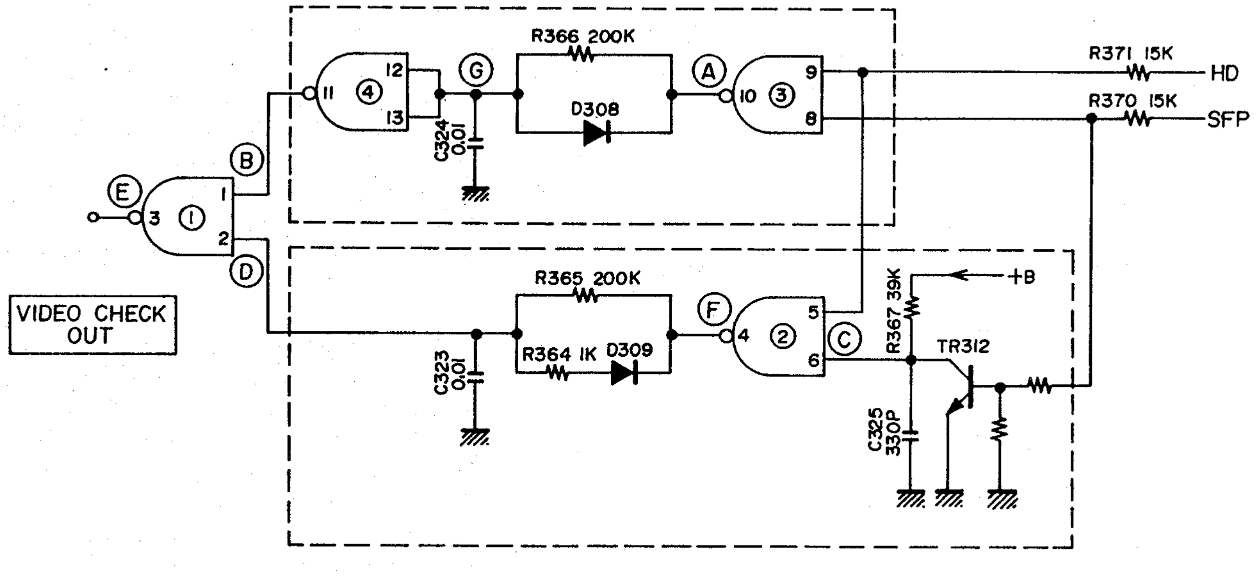


Fig. 29

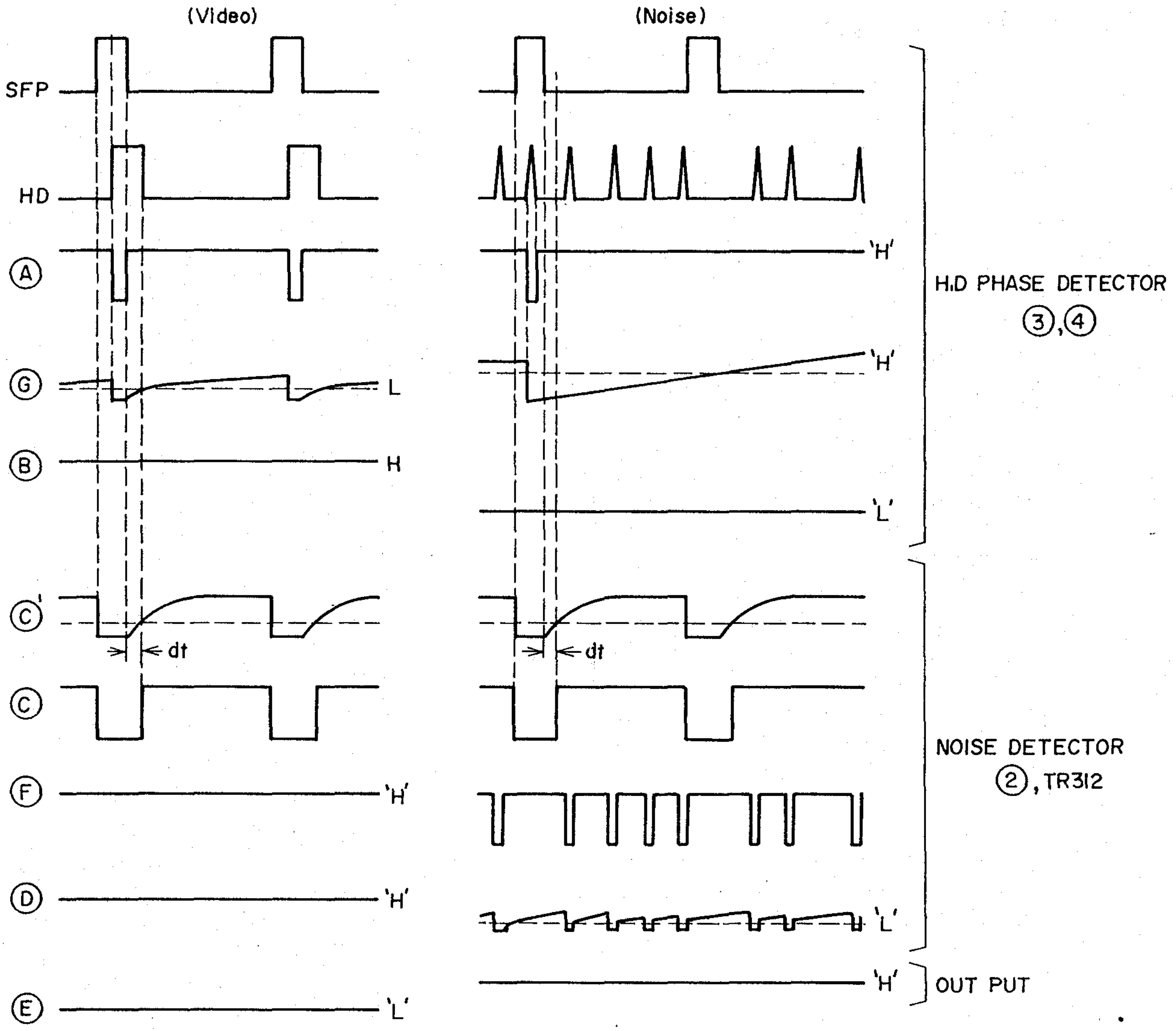

(Video)
(Noise)
SFP
HD
Ⓐ
'H'
Ⓖ
L
'H'
Ⓑ
H
'L'
Ⓒ'
dt
dt
Ⓒ
Ⓕ
'H'
Ⓓ
'H'
'L'
Ⓔ
'L'
'H'
H.D PHASE DETECTOR
③,④
NOISE DETECTOR
②, TR312
OUT PUT

Fig. 30

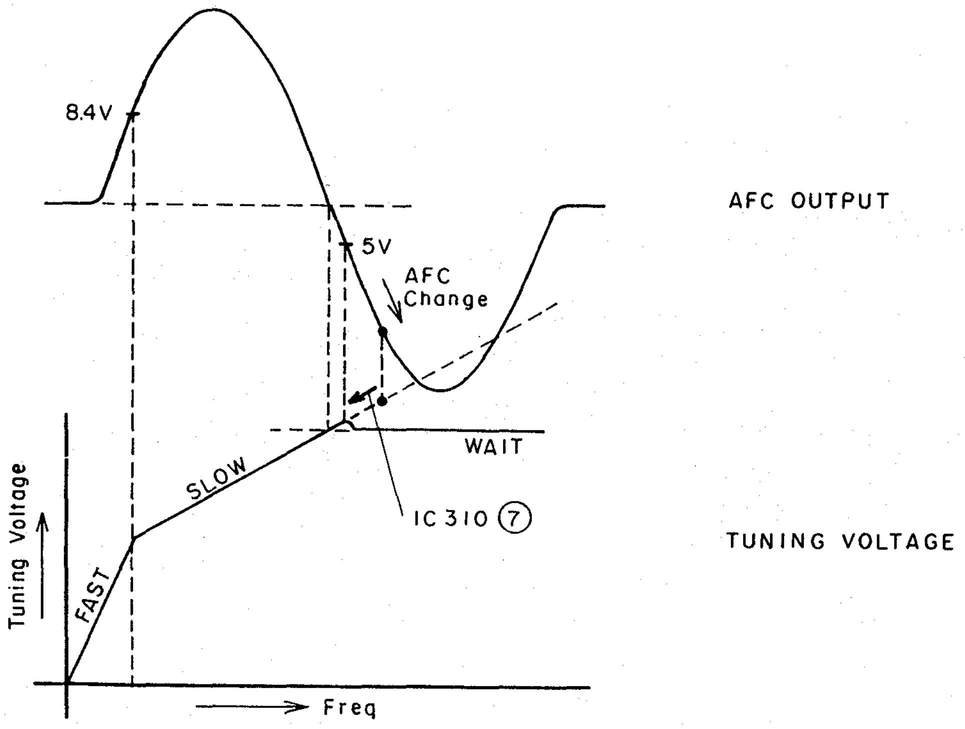

8.4V
5V
AFC
Change
WAIT
SLOW
FAST
IC 310 ⑦
Tuning Voltage
Freq
AFC OUTPUT
TUNING VOLTAGE

Fig. 31

11) Channel to be set is selected.

12) FINE is processed by 4 bits within the microcomputer and outputted from IC307 ⑨ ~ ⑫ as 4 bit output. This data are converted into DC by simple D/A converter IC312 and added to the tuner to make fine adjustment when a TV station is received. At this time, AFT is already operation, and the operation is described. When AFT is OFF, IC311 ⑧ – ⑨ is ON, so to the adder the voltage produced in IC312 ⑦ by the voltage differentiated by R346 and R345 is added. When AFT is ON, IC311 ⑧ – ⑨ is OFF, and conversely IC311 ⑩ – ⑪ is ON, and to the IC312 ⑦, the voltage produced in IC312 ⑦ by the signal from AFC is added. If AFC voltage is reduced and the frequency is increased due to the temperature change, etc., IC312 ⑦ rises and IC310 ⑧ falls and the frequency is reduced. (Fig. 31). FINE is to change the center frequency of AFC and about ±300 kHz of change is possible by ±3V.

13) By pressing the SET (Memorize) key, the memory output order is inputted into IC307. By this order, addressing is carried out by 8 bits of IC307 ⑬ ~ ⑳ (fixed by set channel), and then, the aforementioned 16 bit data (VT: 8 bits, Fine 4 bits, Band 2 bits, Flag 1 bit) are outputted from IC307 ㉞ ~ ㊲, as one word = 4 bits, and stored in IC308.

14) If there is no key input for more than 20 sec. in the search-end mode, the tuner process is automatically finished.

### 3-1-3. Channel Select

The manual memory data reading and the memory data reading when timer recording are carried out by the function key or the timer instruction of IC307. If any one of these instructions is inputted, the address is specified, and the data stored in the address are outputted in 16 bits (one word = 4 bits) as in the above 13 from IC308 ⑩, ⑫, ⑭ and ⑯, and inputted into IC307 ⑨ ~ ⑫. On basis of this data, 8 bit VT output from IC307 ⑬ ~ ⑳, 4 bit FINE data output from ⑨ ~ ⑫, and 2 bit band output from ㉗ – ㉘ are outputted to the respective circuits.

### 3-1-4. Power Down Protection

1) Power Down Detector

A power down detector circuit is provided to detect the power down immediately and to save the necessary data in the external memory while the microcomputer is able to operate. (Fig. 32)

If power down occurs at X point, IC313 ① becomes 'H', and the potential at Ⓐ point is charged to the level shifted by D312 and TR313 (0.6 x 2 = 1.2V) but when the level at Ⓒ passes the threshold level of TR313, ③ will be 5V → 'L', and the power down detecting signal is issued. (Y point). Since the voltage of the capacitor in the power circuit starts decreasing at Z point, during the time t between Y and Z, power is supplied to IC307 from the capacitor. Since the power failure interruption occurs in IC307 due to the power down at Y point (IC307 ④ is the power down input), the necessary data are saved during this time t (completed in about 4 msec).

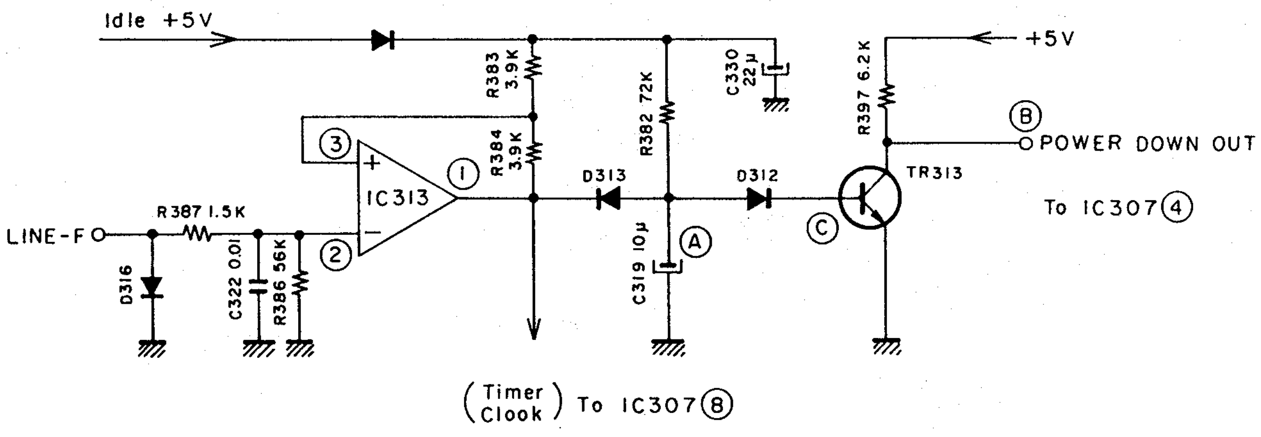


Fig. 32

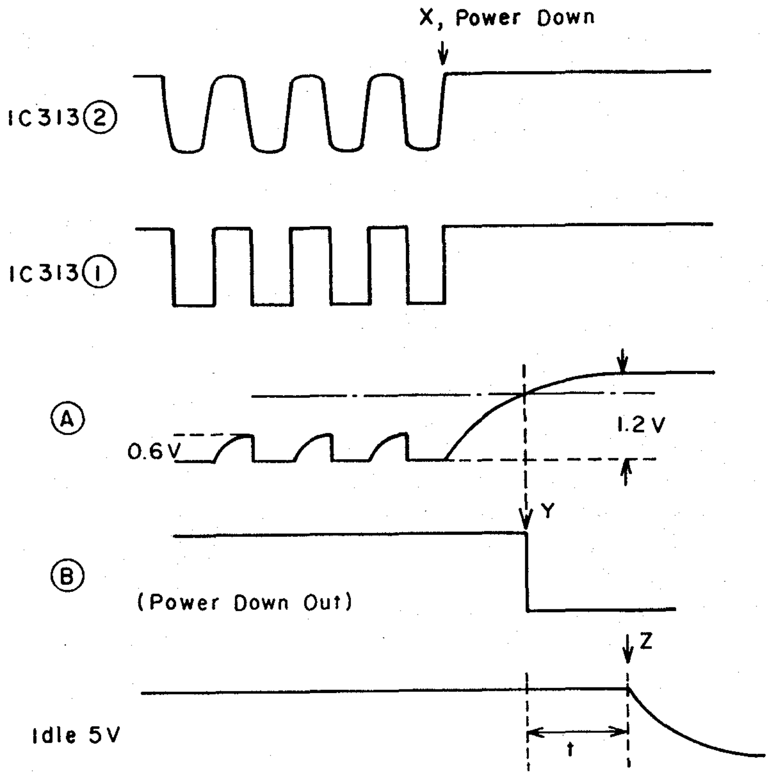


Fig. 33

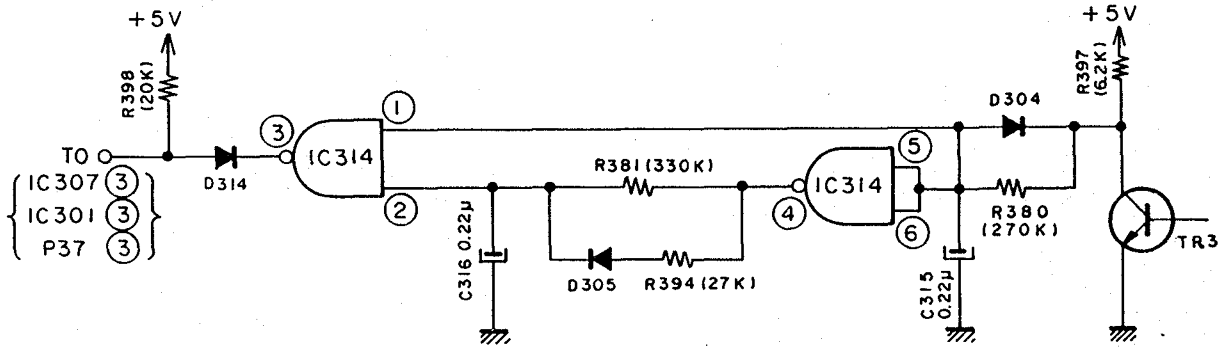

+5V
R398 (20K)
TO
IC307 ③
IC301 ③
P37 ③
D314
③
IC314
①
②
C316 0.22μ
R381 (330K)
D305
R394 (27K)
④
IC314
⑤
⑥
C315 0.22μ
D304
R380 (270K)
+5V
R397 (6.2K)
TR3

Fig. 34

2) Reset Circuit

The microcomputers (IC307, etc) must be reset at the time of power up, otherwise, the program may start from an abnormal address.

This circuit uses IC314 2/4 which is backed up by batteries.

Until the voltage of C315 passes the threshold of IC314 ⑤ and ⑥ after power is turned ON, IC314 ⑤, ⑥ → L → IC314 ④ → H → C316 → charging → until C316 passes the threshold level of IC314 → 'L' → IC314 ③ → H.

If the voltage of C315 passes the threshold level of IC314 ③, ⑥ and

IC314 ① → IC314 ④ → L → until C316 charging → IC314 ① → H → IC314 ③ → L (reset pulse)
IC314 ① → IC314 ① → H → IC314 ③ → L (reset pulse)

See Fig. 34 and Fig. 35.

When power down, TR313 is ON, so → IC314 ⑤, ⑥ / ① → 'L' → IC314 ③ → 'H'.

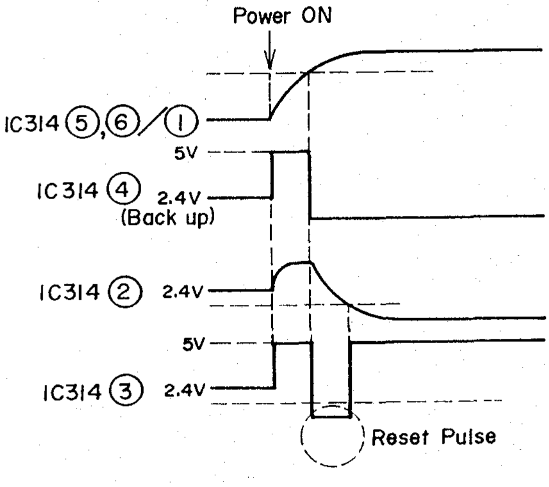


Fig. 35

3) Memory Erasure Prevention Circuit

Since the output of the microcomputers is disturbed by the voltage less than the specified voltage (5 ± 0.5V), a protective circuit must be provided in the external memory (IC308) directly connected to the TTC microcomputer (IC307), otherwise, the memory contents may be changed by the spikes which occur when power is turned ON or OFF.

Therefore, as shown in Fig. 36, RS-FF is made by using 2/4 IC314 to control the disable terminal of the external memory (IC308).

When power is ON, IC314 ③ → H → C318 → Charge up → IC314 ⑧ → H, then IC314 ⑪ → 'L', so the Disable of IC308 (memory) is released, and the Enable ('H') is added to the memory from IC307 ㉔ to make the memory enable. In the case of power down, Power down detector out → 'L' → IC307 ④ → L → Microcomputer data seved → IC307 ㉕ → L → IC314 ⑬ → L → IC314 ⑪ → 'H' → IC308 ⑲ → 'H' → IC308 disable, and the memory contents are protected.

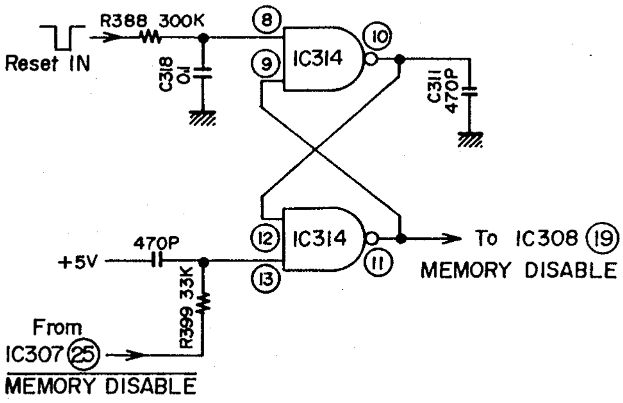

R388 300K
Reset IN
C318 0.1
⑧
⑨
IC314
⑩
C311 470P
⑫
IC314
⑪
⑬
470P
+5V
R399 33K
From IC307 ㉕
MEMORY DISABLE
To IC308 ⑲
MEMORY DISABLE

Fig. 36

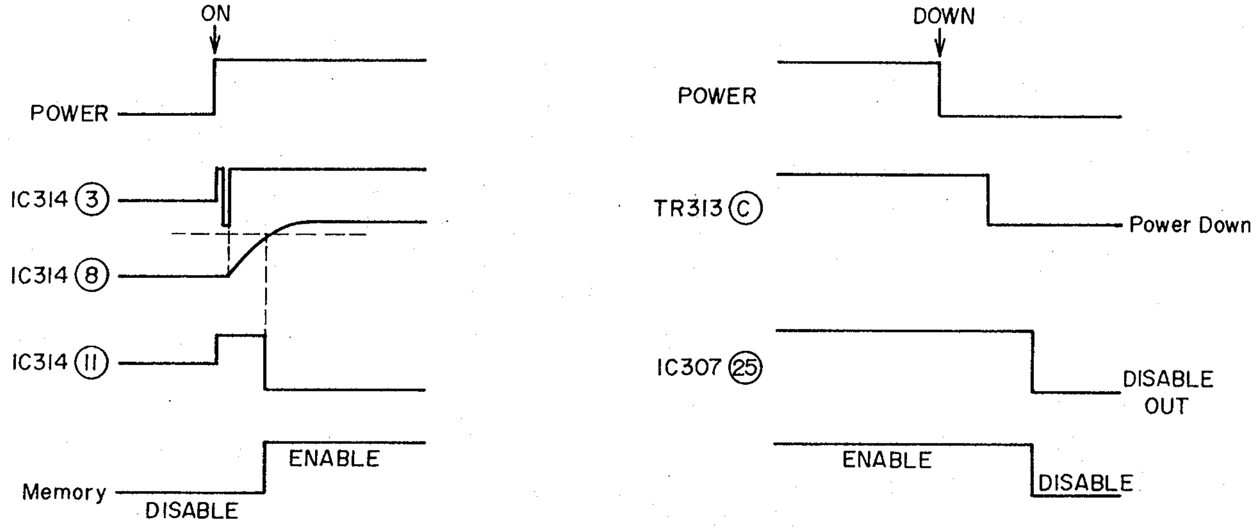

ON
POWER
IC314 ③
IC314 ⑧
IC314 ⑪
Memory
ENABLE
DISABLE
DOWN
POWER
TR313 Ⓒ
Power Down
IC307 ㉕
DISABLE OUT
ENABLE
DISABLE

Fig. 37

4) Back Up

At a power failure, the external memory IC308 and IC314 (RS-FF) are backed up by Ni-Cd batteries. The reason the IC314 is backed up is that this IC controls the memory Enable/Disable of IC308.

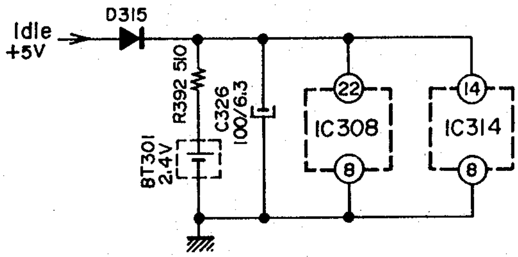

Idle +5V
D315
R392 510
C326 100/6.3
BT301 2.4V
㉒
IC308
⑧
⑭
IC314
⑧

Fig. 38

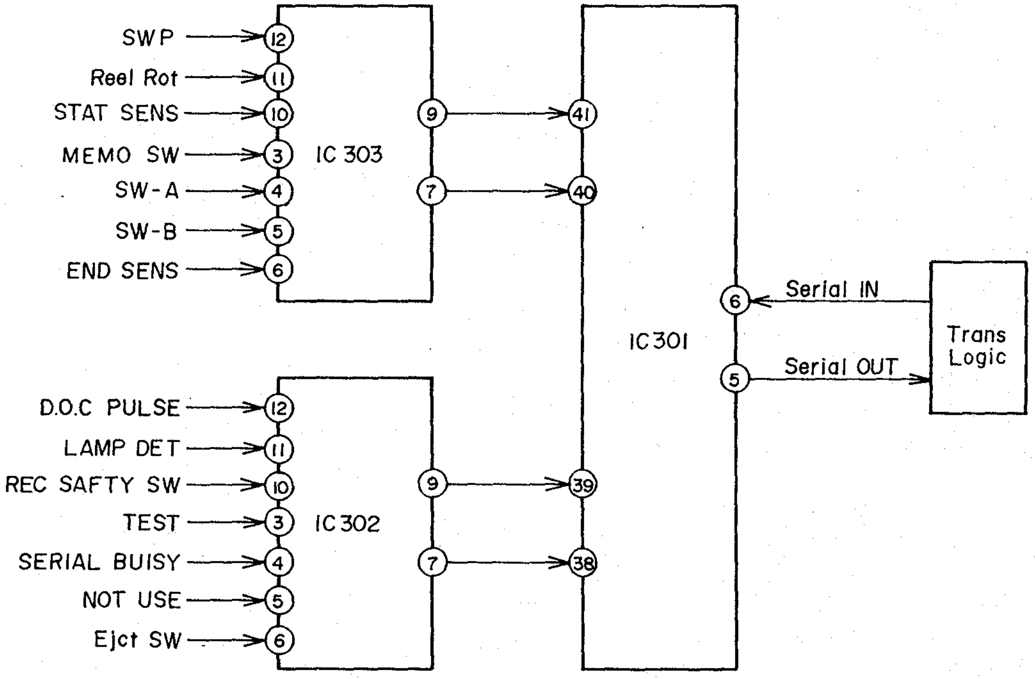

SWP
Reel Rot
STAT SENS
MEMO SW
SW-A
SW-B
END SENS
12
11
10
3
4
5
6
9
7
IC 303
41
40
IC301
6
5
Serial IN
Serial OUT
Trans Logic
D.O.C PULSE
LAMP DET
REC SAFTY SW
TEST
SERIAL BUISY
NOT USE
Ejct SW
12
11
10
3
4
5
6
9
7
IC 302
39
38

Fig. 39

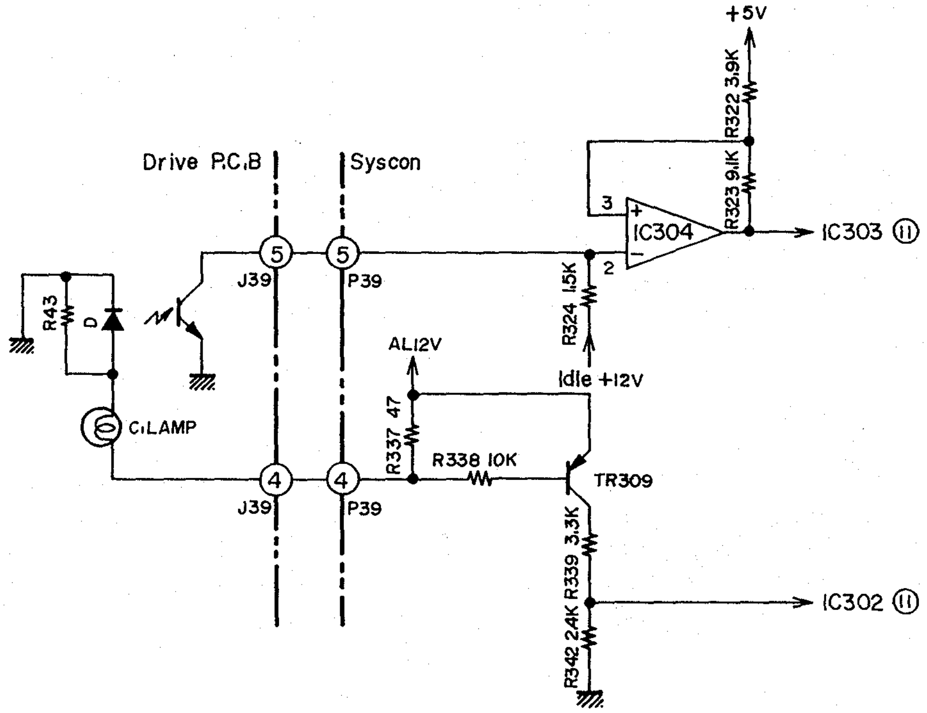

+5V
R322 3.9K
R323 9.1K
3
2
IC304
IC303 ⑪
Drive P.C.B
Syscon
5
5
J39
P39
R43
D
R324 1.5K
AL12V
Idle +12V
C.LAMP
R337 47
R338 10K
TR309
4
4
J39
P39
R339 3.3K
R342 2.4K
IC302 ⑪

Fig. 40

## 3-2. System Control Circuit

The system control circuit consists of the microcomputer (IC301) for system control and two data selectors (IC302, IC303). Each mode data is inputted into IC301 as a serial signal through the transfer logic circuit, and all kinds of the warning data, as a parallel input of 16 bits (actually part of them is not used), divided into 8 bits each to IC302 and IC303 and then selected into 2 bits each by the same IC and is inputted into IC301 as 4 bit parallel signal.

### 3-2-1. Reel Rotating Pulse and Lamp Detector

The lamp is lit through R337 (47 ohms) when AL+12 is issued after power is turned ON. If normal, TR308 'B' → L → TR309 → ON → IC302 ⑪ → 'H' but if the lamp is burned out or being burnt, TR309 'B' → H → TR309 → OFF → IC302 ⑪ → 'L' and the lamp abnormality is detected, then IC301 ㉘ → 'L' and the buzzer is sounded, and the data indicating the breakdown is sent to TTC through the serial out terminal (IC301 ⑤). If POWER ON button is pressed under such circumstances, the buzzer sounds and power goes OFF.

The reel rotation is detected by the photo interrupter, and the LED is put in series with the lamp to utilize the lamp current effectively. R43 is a shunt resistance. IC304, R322 and R323 make a Schmitt circuit and the leading edge of the reel pulse is detected by the microcomputer (IC303). In the microcomputer program, the tape count mode is determined by this pulse. In the case of power OFF, stand-by or no cassette, regardless of the input, it will be minus during the tape loading, and in other cases, it will be plus or minus in accordance with the M-REV output (IC301 ㉛) produced within the microcomputer.

This pulse is also used to detect the reel stop. If there is no leading edge input within 1.7 sec. in FF or REW or within 2.1 sec. in PLAY, S-DUB, CUE and REVIEW, it is taken as real stop, and the buzzer is sounded and STOP mode is started. If there is any one leading edge within that time, the time is counted from the edge, and when the next edge does not come within the time shown in Fig. 41, it is taken as reel stop and as described above, the buzzer is sounded and STOP mode starts.

| Mode | No Pulse Interval |
|---|---|
| FF or REW | More than 0.12 sec |
| Cue or Review | More than 0.3 sec |
| Normal Speed | More than 1.3 sec |

Fig. 41

### 3-2-2. Drum Motor Load Detection

Overload is detected by watching the interval of the leading edges of the switching pulse. If a leading edge does not come within 0.5 sec. after PAUSE mode started, it is taken that the drum is not rotating and the buzzer is sounded and STOP mode starts. If any one leading edge is inputted within 0.5 sec., and if the next edge does not come within 0.1 sec. from the edge, it is judged that the drum load is too heavy, and the buzzer is sounded and STOP mode starts.

### 3-2-3. Loading and Unloading Detection

At the same time when the loading motor is turned ON and the loading cam start rotating, the next safety timer is set depending on the mode within the microcomputer.

| | |
|---|---|
| Tape Loading and Unloading | 4 sec. |
| Idler Loading and Unloading | 1.7 sec. |
| Cassette Unloading | |

If the loading SWs 'A' and 'B' are not turned ON within the time, the microcomputer judges that there was some serious trouble, and indicates the breakdown immediately after 0.3 sec. and at the same time $\overline{AL}$ output (IC301 ⑯) becomes 'H', TR303 is turned OFF, and AL + 12 becomes 'O'. Then, the TR of the power circuit is turned OFF, and the power is cut off. If the front POWER SW is turned ON under the breakdown caused by the loading or unloading trouble, another breakdown will occur except when the cassette unloading trouble is detected, and no reset is available.

Therefore, to release the breakdown due to the loading/unloading trouble, the POWER SW must be turned OFF once and then must be switched ON again. If the cause is not removed in such cases, the breakdown will occur continuously after 4.3 sec. (4 sec. + 0.3 sec.) or 2.0 sec. (1.7 sec. + 0.3 sec.).

## 3-3. Additional Circuits

### 3-3-1. Transfer Logic Circuit

Since VS-5 uses three microcomputers (Control, Syscon, TTC), it is necessary to transfer data among these three microcomputers. Therefore, the Control microcomputer takes the initiative to exchange data synchronously with TTC and Syscon.

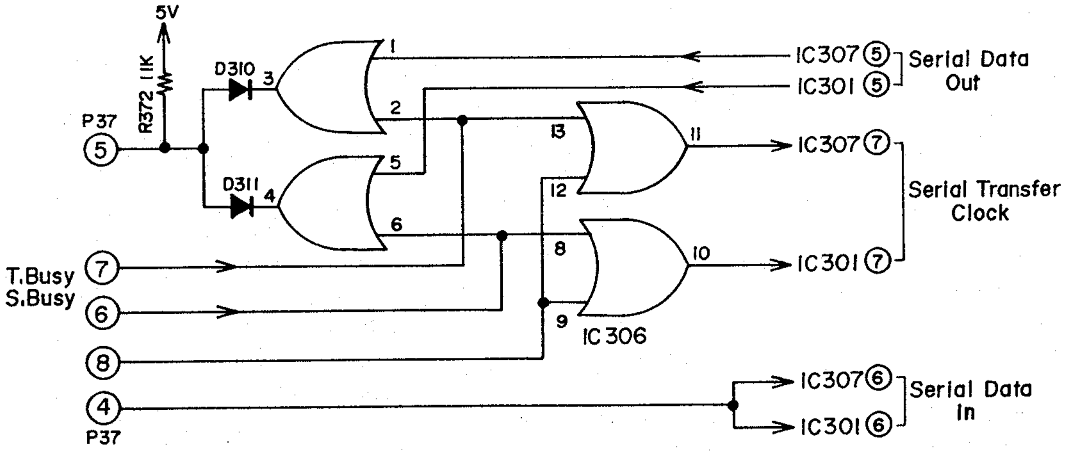


Fig. 42

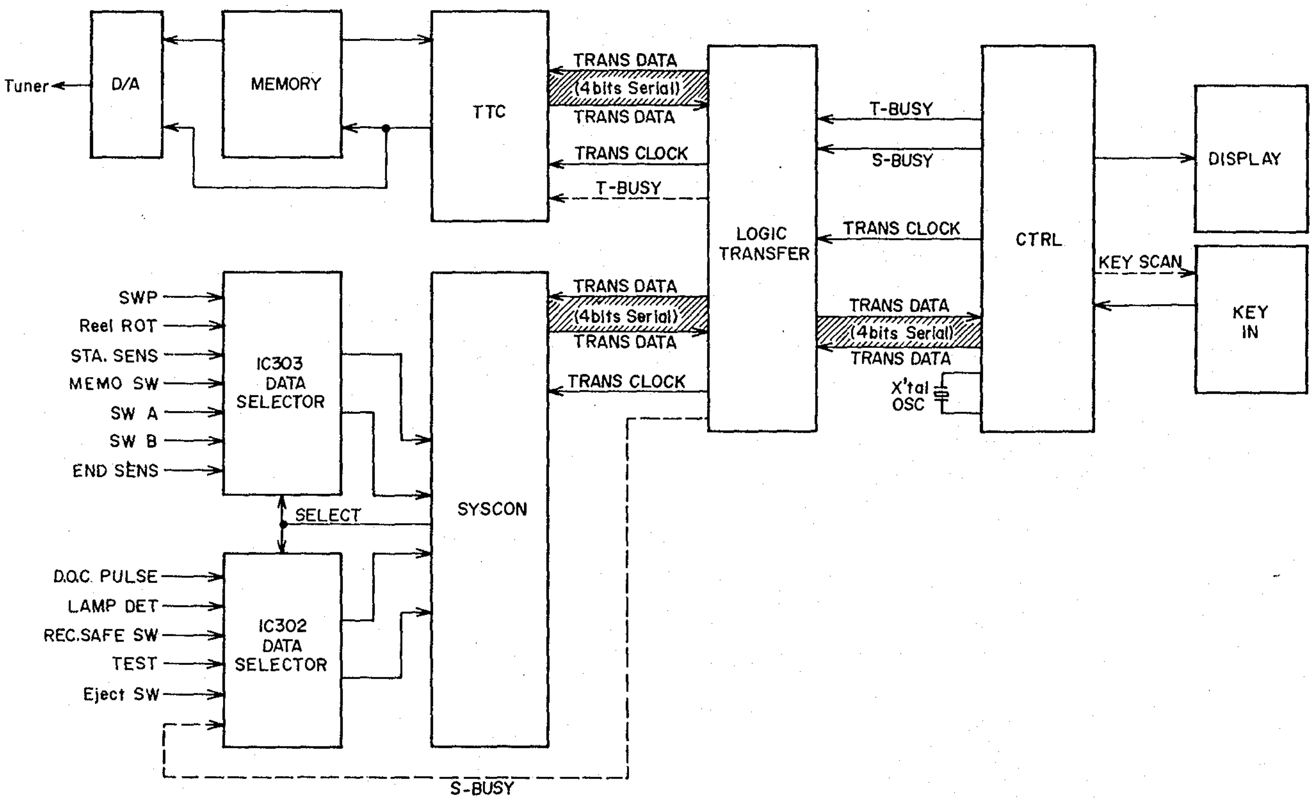

Tuner
D/A
MEMORY
TTC
TRANS DATA
(4bits Serial)
TRANS DATA
TRANS CLOCK
T-BUSY
LOGIC TRANSFER
T-BUSY
S-BUSY
TRANS CLOCK
CTRL
DISPLAY
KEY SCAN
KEY IN
TRANS DATA
(4bits Serial)
TRANS DATA
X'tal OSC
SWP
Reel ROT
STA. SENS
MEMO SW
SW A
SW B
END SENS
IC303 DATA SELECTOR
SELECT
SYSCON
TRANS CLOCK
D.O.C. PULSE
LAMP DET
REC.SAFE SW
TEST
Eject SW
IC302 DATA SELECTOR
S-BUSY

Fig. 43

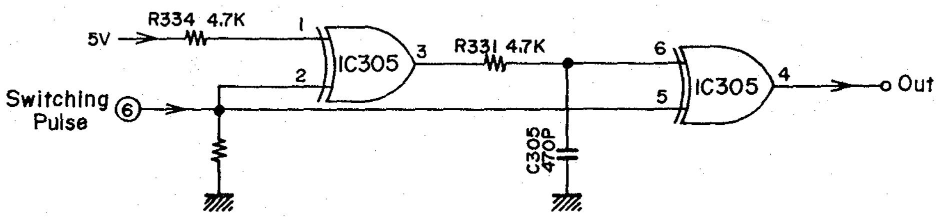

R334 4.7K
5V
1
2
IC305
3
R331 4.7K
6
5
IC305
4
Out
Switching Pulse ⑥
C305 470P

Fig. 44

In T-Busy cycle, IC306 ② / ⑬ becomes 'H' and IC306 ⑥ / ⑧ becomes 'L', and data is inputted into IC301 ⑦, and the data from IC301 ⑤ is inputted into LC306 ⑤ and outputted from IC306 ④. TTC/Syscon/CTRL signal block diagram is shown in Fig. 43.

### 3-3-2. Pseudo V Pulse Generation (Equalizing Pulse)

In STILL, 50 Hz is made synchronizing with the edge of the switching pulse to prevent the picture deviation which is caused by the existence of 1.5H difference per field. This is executed by the program of the microcomputer. See Figs. 44 to 46.

### 3-3-3. Buzzer Circuit

Syscon microcomputer (IC301) ⑬ → L → IC305 OSC → Oscillation or the buzzer can be driven directly by the microcomputer because piezoelectric type is used.

| A | B | Q |
|---|---|---|
| H | H | L |
| H | L | H |
| L | H | H |
| L | L | L |

EX-OR TRUTH TABLE

Fig. 45

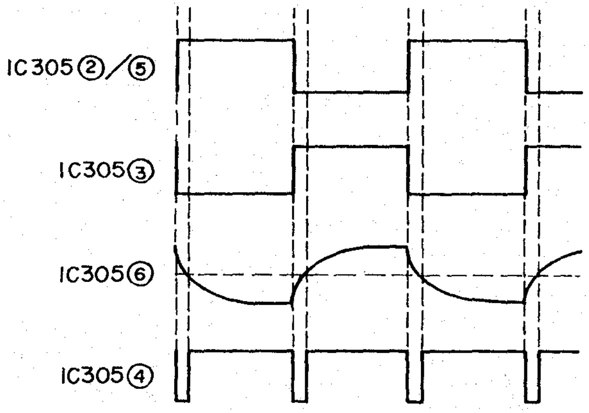

IC305②/⑤
IC305③
IC305⑥
IC305④

Fig. 46

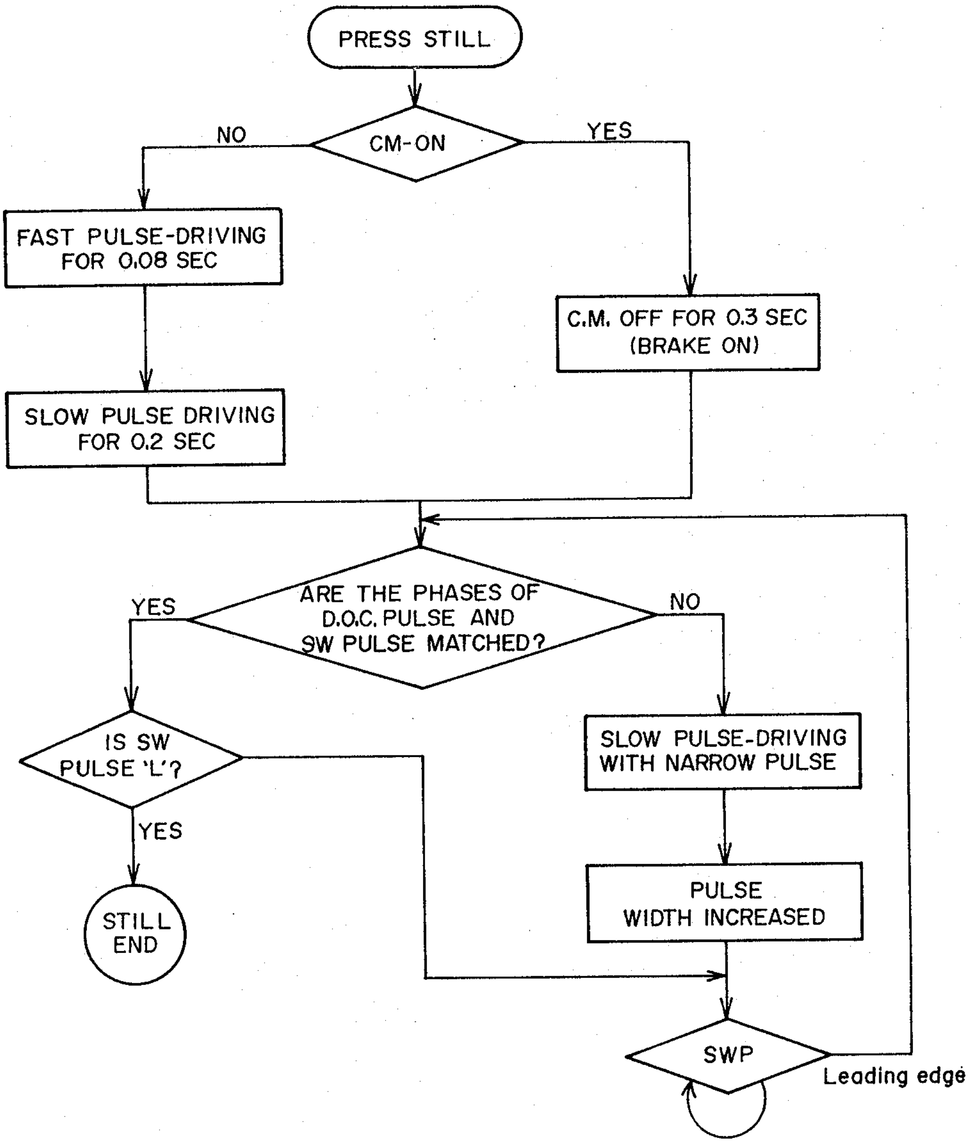

PRESS STILL
CM-ON
NO
YES
FAST PULSE-DRIVING FOR 0.08 SEC
C.M. OFF FOR 0.3 SEC (BRAKE ON)
SLOW PULSE DRIVING FOR 0.2 SEC
ARE THE PHASES OF D.O.C. PULSE AND SW PULSE MATCHED?
YES
NO
IS SW PULSE 'L'?
YES
SLOW PULSE-DRIVING WITH NARROW PULSE
PULSE WIDTH INCREASED
STILL END
SWP
Leading edge

Fig. 47

### 3-3-4. STILL Control

VS-5 obtains the still picture by pulse-driving the capstan motor (C.M.) thus feeding the tape little by little and by comparing the phases of the DOC-Pulse made by the video circuit and of the drum FF in accordance with the program of the following (Fig. 47) within the IC301. The pulse-driving pulse is triggered by the up-edge of the drum FF (switching pulse).

Therefore, the synchronization is 25 Hz. When the STILL key is pressed, check is made to see whether the CM is operating and if it is operating, brake is applied for 0.3 sec. to bring it almost to the stop.

If the CM is not operating, it is taken as frame advance, and the tape is pulse-driven fast for the first 0.08 sec. and a little slower for the next 0.2 sec. to shorten the reverse channel playback.

Then, check is made of the phases of the DOC pulse and the switching pulse, and if the leading edge of the SW pulse matches the phase of the DOC, the still status is achieved. If they are not matched, resetting is made and the tape is fed slowly being pulse-driven with slow pulse length.

Even if the phase are matched, the work should not be stopped so soon because it will go too far if the tape speed is not sufficiently slow. Therefore, check must be made to confirm that the speed is sufficiently slow and when the phases are matched 5 times, the STILL is finished.

If the phases are not continuously matched 5 times, the pulse-driving is continued slowly until 5 time matching of the phases is achieved. However, despite the fact that the slow driving is possible under the normal temperature, it may happen that the pulse does not move so smoothly under the low temperature. Therefore, each time they are not matched, the pulse width is increased a little. In this way, VS-5 uses the microcomputer to achieve STILL, and consequently no adjustment is possible after the picture is actually stopped. But from many experimental results, the best value is set so that there will be no problem. Therefore, in such cases, it is necessary to check whether the operation of the driving system is correctly being carried out.

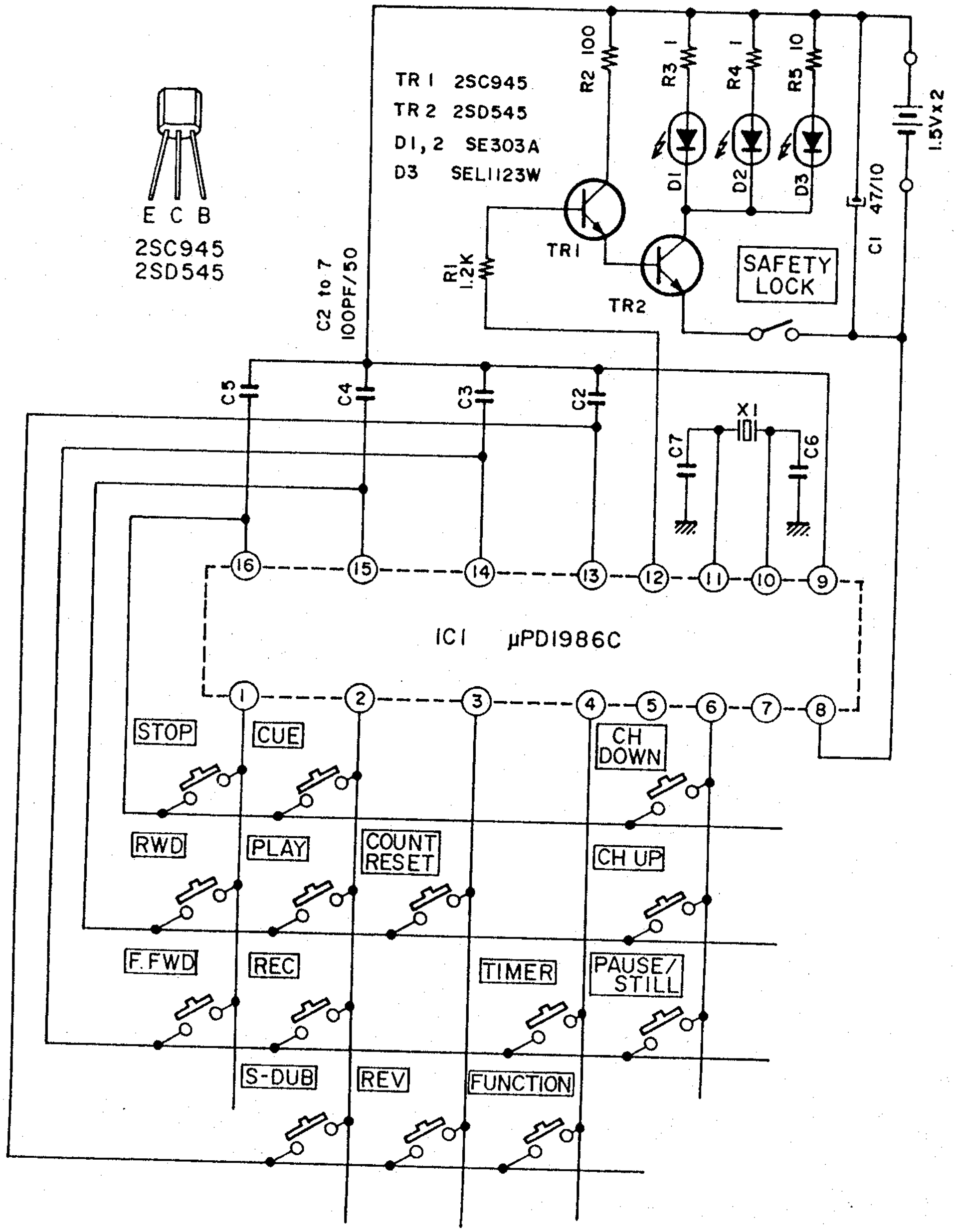

E C B
2SC945
2SD545
TR1 2SC945
TR2 2SD545
D1, 2 SE303A
D3 SEL1123W
R2 100
R3 1
R4 1
R5 10
D1
D2
D3
1.5V×2
C1 47/10
TR1
TR2
R1 1.2K
SAFETY LOCK
C2 to 7 100PF/50
C5
C4
C3
C2
X1
C7
C6
16
15
14
13
12
11
10
9
IC1 μPD1986C
1
2
3
4
5
6
7
8
STOP
CUE
CH DOWN
RWD
PLAY
COUNT RESET
CH UP
F.FWD
REC
TIMER
PAUSE/ STILL
S-DUB
REV
FUNCTION

Fig. 48

## 3-4. Remote Control Unit

Infrared-ray IC MPD1986C is used. The carrier is 38 kHz. While the keys, CHANNEL UP, CHANNEL DOWN and PAUSE/STILL are pressed, the pulses as shown in Fig. 49 are transmitted continuously at the interval of 36 msec.

Other keys do not work after the signal is issued twice, thus saving the battery. To prevent the unnecessary transmission, the power SW is provided at the side.

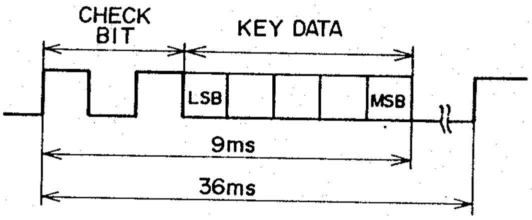

CHECK BIT
KEY DATA
LSB
MSB
9ms
36ms

Fig. 49

## 4. VIDEO AMPLIFIER CIRCUIT

### 4-1. Y Signal System

#### 4-1-1. Recording Circuit

1) 5 MHz LPF (LCB-51)

The input video signal is terminated by 75 ohms within the rear substrate and enters 5M LPF LCB-51. The LPF is to correct the phase distortion of Y and chroma of the recording system and delays the Y signal by 0.2 msec. using a LPF of 5 MHz. Fig. 51 shows the delay time relationship of the filters.

2) AGC (AN6310)

The video signal passing the 5 MHz LPF enters AGC of AN6310.

One of the reasons AN6310 is used for the IC of recording system instead of HA11701 (VS-9700) is its superior AGC characteristic. Both ICs are keyed + peak type AGC but there is a considerable difference between them in input and output characteristic (Fig. 52), i.e. the AGC characteristic of HA11701 was that a constant level could not be obtained at the time of excessive input and for the signal with high luminance such as VIT signal

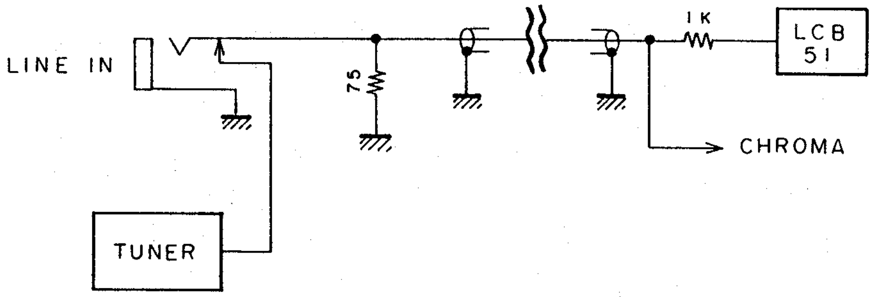

LINE IN
75
1K
LCB 51
CHROMA
TUNER

Fig. 50

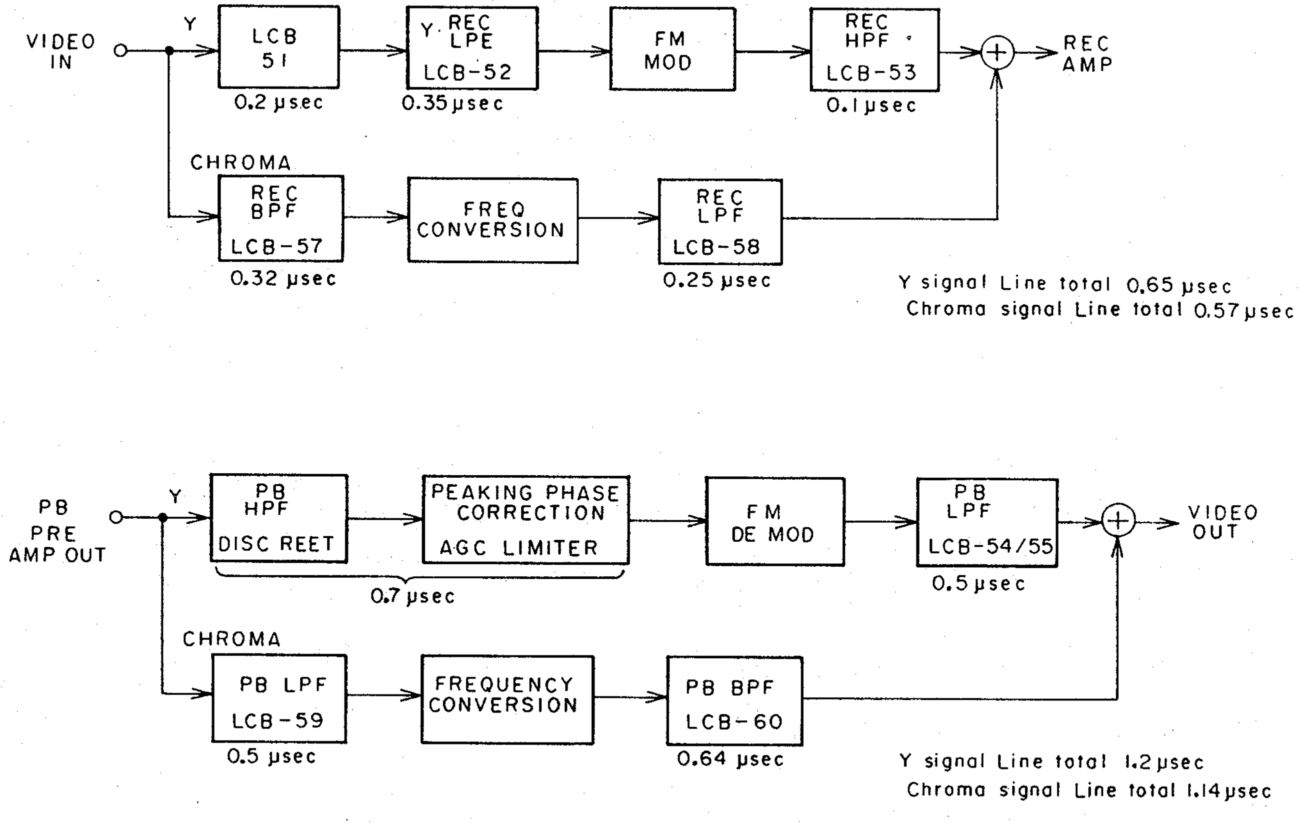

VIDEO IN
Y
LCB 51
0.2 μsec
Y REC LPE
LCB-52
0.35 μsec
FM MOD
REC HPF
LCB-53
0.1 μsec
REC AMP
CHROMA
REC BPF
LCB-57
0.32 μsec
FREQ CONVERSION
REC LPF
LCB-58
0.25 μsec
Y signal Line total 0.65 μsec
Chroma signal Line total 0.57 μsec
PB PRE AMP OUT
Y
PB HPF
DISC REET
PEAKING PHASE CORRECTION
AGC LIMITER
0.7 μsec
FM DE MOD
PB LPF
LCB-54/55
0.5 μsec
VIDEO OUT
CHROMA
PB LPF
LCB-59
0.5 μsec
FREQUENCY CONVERSION
PB BPF
LCB-60
0.64 μsec
Y signal Line total 1.2 μsec
Chroma signal Line total 1.14 μsec

Fig. 51

(recognizing signal in V blanking), the level could not be sufficiently controlled and buzz was produced. On the other hand, in case of the AGC characteristic of AN6310, the level is sufficiently controlled as shown in Fig. 52, and even when such a signal enters, no excessive input will go into the RF converter and buzz will not be produced so easily.

The keyed + peak AGC means that when the peak-to-peak is within a certain size, AGC works so as to keep the size of SYNC constant and when the peak-to-peak reaches a certain level, it works so as to keep the entire level constant. The VIT signal is the signal put into the V blanking immediately after the V SYNC by TV stations, etc., to compensate and recognize the characteristic of the transmitting system, but there is a large APL fluctuation after the V SYNC and it seems that some stations have excessively large VIT signals and they are one of the causes for buzz. (VS-9700).

Also, it seems that some stations input a static picture called teletext also immediately after the V SYNC in addition to the VIT signal and that the SYNC ratio of the video signal varies widely depending on the stations, and these also produce buzz. If AN6310 (improved version of AN6300) as the AGC, the peak does not exceed a certain level and the buzz problem is solved. In case of the AGC output level, the gain is changed by VR1 (20K) to control the E-E level. The AGC time constant is determined by C and R of Pin ④.

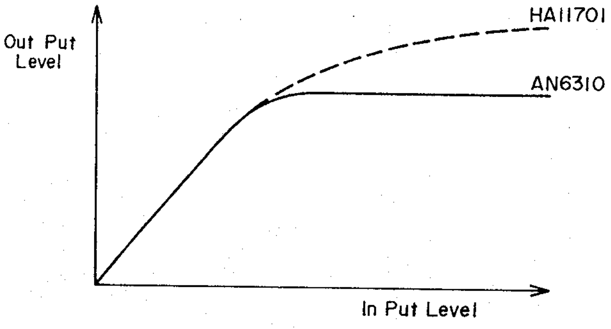


Fig. 52

3) REC Y LPF (LCB-52)

The signal from AGC partially enters HA11703 as E-E, and is outputted to VIDEO OUT by E-E and PB switching. Fig. 53 shows the characteristic of LCB-52. The signal from the AGC enters REC-Y-LPF LCB-52 and the chroma signal of 4.43 MHz is removed. Since VS-5 does not change the band by color and B/W, the signal always passes this filter. Therefore, Pin ㉓ (Color-B/W change-over) of AN6310 is connected to Vcc and no change-over is made. Phase characteristic is improved because REC and PB are not using a same LPF.

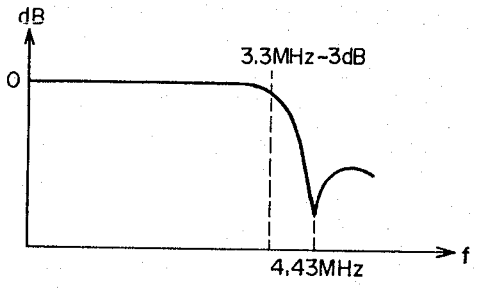


Fig. 53

4) Non-linear Emphasis

After the LPF, the signal enters the non-linear emphasis.

The non-linear emphasis is more effective for the signal with smaller amplitude, and if this process is made when recording, S/N and modulation factor will be improved when regenerating. As shown in Fig. 54, it uses the characteristic of diode, and if the level is large, the diode is turned ON and no emphasis is applied by the time constant of C1 R1 and C2 R2 and if the level is small, D1 and D2 are OFF, and by the time constant of C1, R1 and R2, emphasis is applied. Therefore, the frequency characteristic of the signal with smaller level can be reduced that much, and the S/N of the flat part can be improved. If the frequency characteristic is left as it is when regenerating, the modulation factor will be increased to the extent that emphasis was applied when recording. VS-5 has the emphasis of 3 ~ 4 dB for the signal of −20 dB. (Fig. 55)

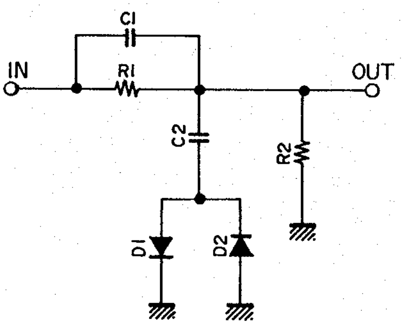


Fig. 54

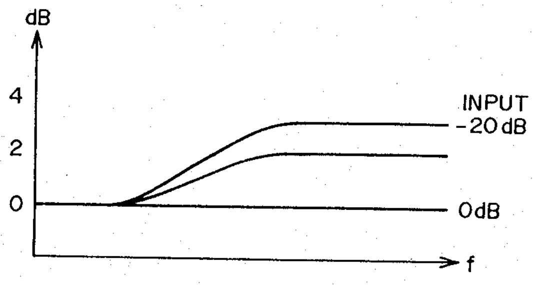


Fig. 55

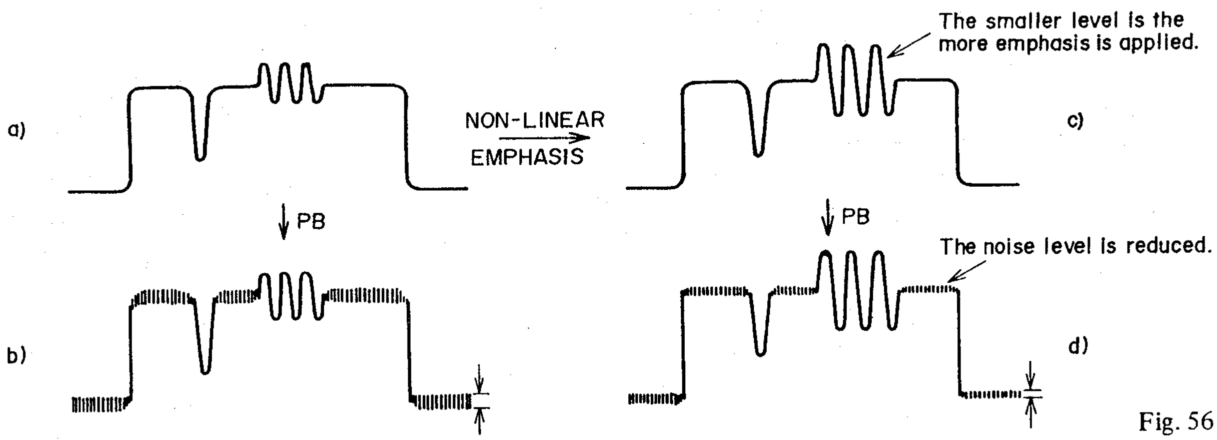

a)
NON-LINEAR
EMPHASIS
The smaller level is the more emphasis is applied.
c)
PB
PB
The noise level is reduced.
b)
d)

Fig. 56

For the actual waveform, the S/N can be improved as shown in Fig. 56.
On voltage of the diode is 0.2 to 0.3V (1SS16), so the input of the nonlinear emphasis is about 2 Vp-p. Since the chroma signal which was not removed by the REC LPF because the emphasis was on or the chroma signal leaking due to the pattern is leveled up, a trap (27pF, 27μH) is provided to eliminate it.

5) CLAMP, PRE-EMPHASIS, DARK CLIP, WHITE CLIP
After the non-linear emphasis, the signal passes Clamp, Pre-emphasis and Clip and. enters FM modulator. The clamp is to make the carrier frequency of SYNC TIP constant. Than, the ordinary pre-emphasis is applied. This curve is stipulated by the VHS specification and is shown in Fig. 57. This is determined by C and R connected to Pin ⑪ of AN6310.
Then dark clip and white clip are applied. This clip circuit is called soft clip circuit. By this method, the waveform is clipped as if it were crushed from the top as shown in Fig. 58. Fig. 59 shows the circuit.

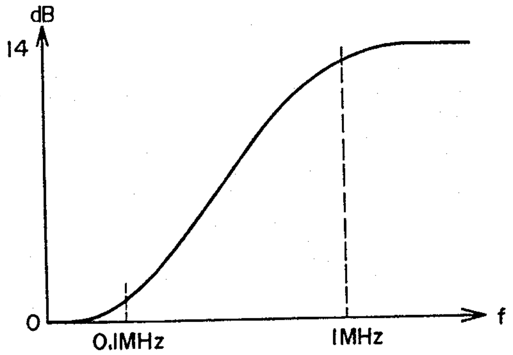


Fig. 57

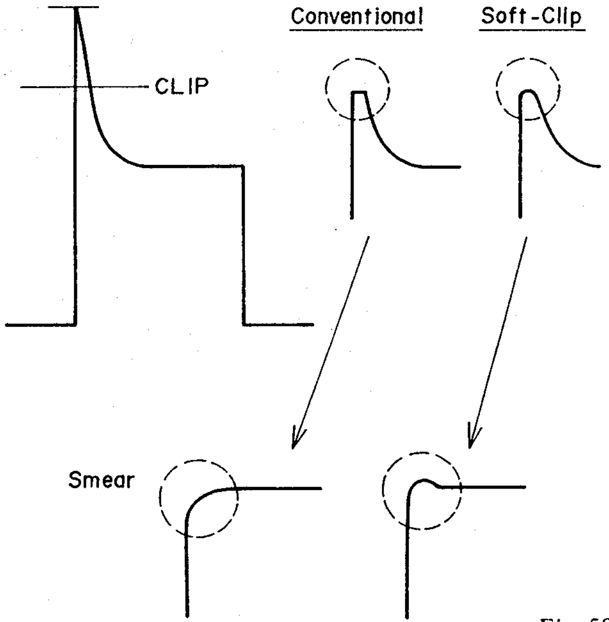

Conventional
Soft-Clip
CLIP
Smear

Fig. 58

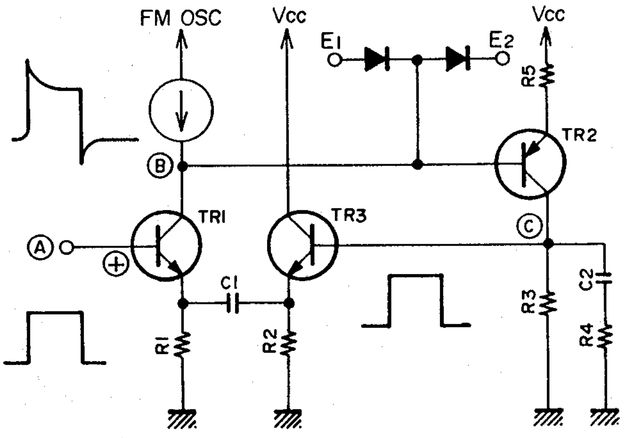

FM OSC
Vcc
Vcc
E1
E2
R5
TR2
Ⓑ
TR1
TR3
Ⓒ
Ⓐ
⊕
C1
R1
R2
R3
C2
R4

Fig. 59

a) Q1, Q2 and Q3 set up a differential amplifier. The constant-current source of collector load of Q1 is FM OSC and the frequency changes in proportion to the collector current of Q1.

b) If Ⓐ is inputted to ⊕ of the amplifier, the output Ⓒ is negatively fed back to the base of ⊖ input Q3.
R3, R4 and C2 set up a de-emphasis.
c) As a result, at FM OSC (collector of Q1), the pre-emphasized waveform which will be the same waveform as that of the input Ⓐ when the de-emphasis is transmitted, is produced.
d) The waveform preemphasized by the voltage of E1 and E2 is clipped. But for the same reason as given in ③, the waveform is so clipped that it will become approximately the same as the input waveform when de-emphasized.
e) As a result, the smear due to clipping is improved.

The clip level is determined by VR3 (white clip) and VR4 (dark clip) and is adjusted to 160% and −40% respectively.

6) FM Modulator

The signal is modulated into FM by the FM modulator within AN6310. The oscillation frequency is determined by the capacity 75p (68p + 7p) + α (trimmer) or Pins ⑬ and ⑭, and is set at 3.8 MHz by SYNC TIP.

7) REC Y HPF (LCB-53)

The FM signal enters HPF (LCB-53) to eliminate the interference with the chroma. It always passes this filter because there is no Color-B/W change-over. The cut-off frequency is 1.4 MHz. This is received by EF and sent to REC AMP.

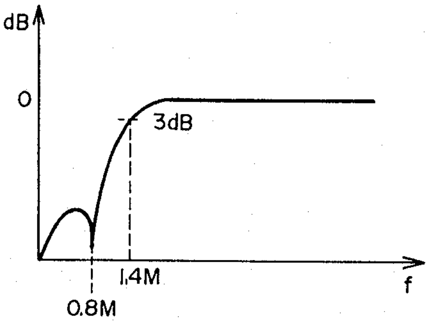
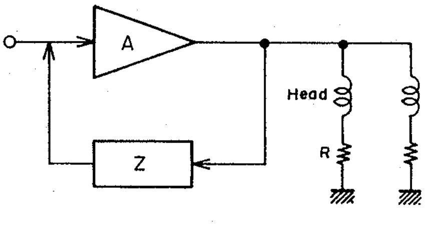


Fig. 60

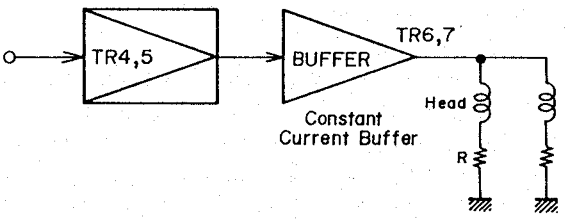
8) REC AMP

As shown in Fig. 61 (a), the REC AMP of VS-9700 determines the REC AMP frequency characteristic (VHS specification) by applying the feedback Z to the Gain −A amplifier, and the output is constant-voltage driven.

On the other hand, the REC AMP of VS-5 determines the frequency characteristic with the preceding amplifier (TR4, 5) and after that, it provides the constant-current buffer (TR6, 7) and the output is constant-current driven. The advantage of the constant-current type is that the current does not change even if the inductance of the head changes a little. For example, in the case of constant-voltage type, if the inductance has changed due to the wear or time aging of the head, the current will be changed in proportion to the inductance thus changing the recording current, but in the case of the constant-current type, the current will remain constant even if the inductance is changed thus assuring the constant recording current. Also, the frequency characteristic of REC AMP is determined by C29 (7p), C28 (11p) and R31 (1.5K). (Fig. 62). Fig. 63 shows the recording signal mixer section, and the FM signal of Y and chroma signal (low band conversion 627 kHz) are mixed before the REC AMP. The power supply of the REC AMP is controlled by the signal REC MUTE as shown in Fig. 64. This is to prevent the recording current because the regenerating mode is provided once when AEC (electronic editing).

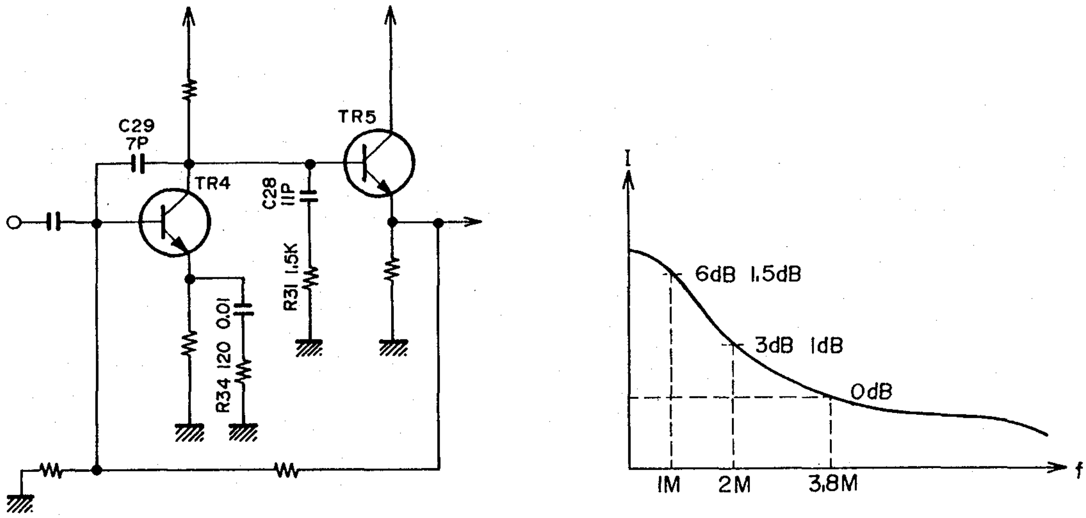


a) Conventional Rec Amp



b) VS-5 Rec Amp

Fig. 61


C29
7P
TR4
C28
11P
TR5
R31 1.5K
R34 120
0.01
I
6dB 1.5dB
3dB 1dB
0dB
1M
2M
3.8M
f

(a) (b)

Fig. 62

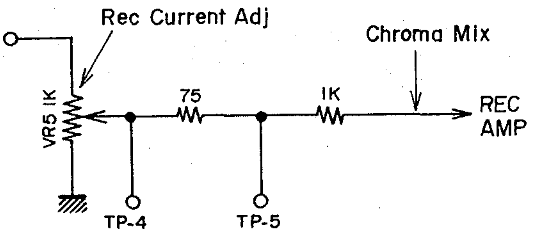

Rec Current Adj
Chroma Mix
VR5 1K
75
1K
REC
AMP
TP-4
TP-5

Fig. 63

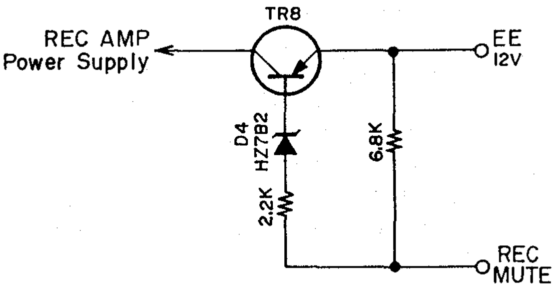

TR8
REC AMP
Power Supply
EE
12V
D4
HZ7B2
2.2K
6.8K
REC
MUTE

Fig. 64

## 4-1-2. Y Signal Play Back Circuit

1) Pre Amplifier

For the matching with the head, the peaking frequency (4.5 MHz) is adjusted by the trimmer condensers VC 2 and 3 and the damping (4.5M/1M:1.8) by VR6 and VR7. VS-9700 applies the peaking of LCR at Pins ⑧ and ⑭ of AN6320N, but VS-5 has a peaking circuit at a later stage and it has not peaking in here.

The output of the pre amplifier is made at EF when CH1 and CH2 are switched. It has no such PB FM balance as provided in VS-9700 but instead, it used AGC HA11718 to eliminate this adjustment.

The output of the pre amplifier is outputted by the connector at TP6 as FM envelope.

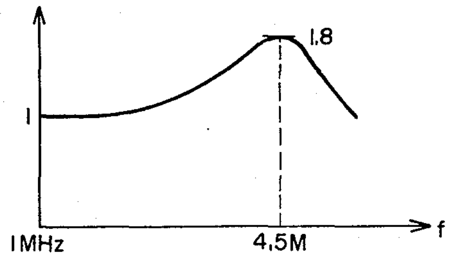
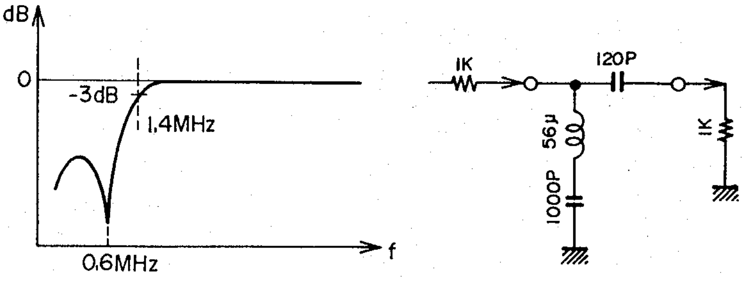


Fig. 65

2) HPF, PEAKING, PHASE COMPENSATION

HPF is provided discrete and the characteristic is shown in Fig. 66.


dB
0
-3dB
1.4MHz
0.6MHz
f
1K
120P
56μ
1000P
1K

(a) (b)

Fig. 66

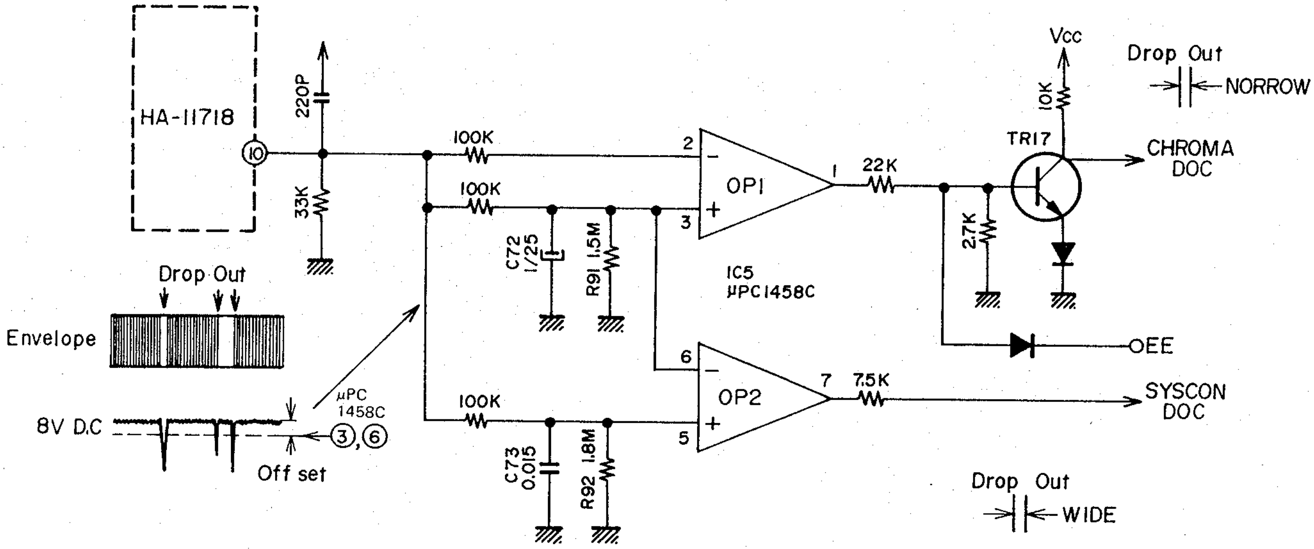

HA-11718
10
220P
33K
Drop Out
Envelope
8V D.C
μPC 1458C
③,⑥
Off set
100K
100K
100K
C72 1/25
R91 1.5M
C73 0.015
R92 1.8M
2
3
6
5
OP1
OP2
1
7
IC5
μPC1458C
22K
7.5K
Vcc
10K
TR17
2.7K
EE
Drop Out
NORROW
CHROMA DOC
SYSCON DOC
Drop Out
WIDE

Fig. 67

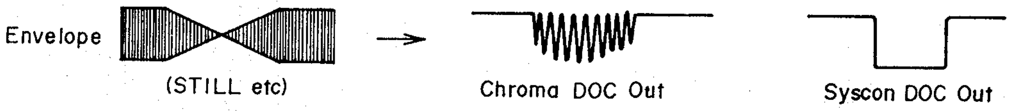

Envelope
(STILL etc)
Chroma DOC Out
Syscon DOC Out

Fig. 68

After the HPF, peaking is applied by TR13 nearly to 5.5 MHz. The resonance with the head and the peaking at a later stage amount to the total peaking of about 4 times.

3) AGC, DOC

Due to the provision of PB system AGC, FM balance at PB is not required. HA11718 includes pre amplifier, AGC and DOC, but the pre amplifier and AGC, if used simultaneously, may interfere each other in PAL band, and also there are many use problems such as oscillation, and therefore, AGC and DOC only are used and for the head amplifier, AN6320N is used. DOC detection sensitivity is changed by the resistance R85 (3.3K) of Pin ⑨.

4) DOC Pulse

The chroma circuit of VS-5 is designed not to gate AFC and burst when there is a drop-out in the function of AN6362. For this reason, DOC pulse is required. Also, when STILL, the microcomputer sends the noise bar to the lower part of the picture by using the DOC pulse.

At Pin ⑩ of HA11718 there appear waveforms as shown in Fig. 67, in proportion to the drop-outs. From these the DOC pulse is made with the use of an operational amplifier (μPC 1458C). To eliminate the dispersion of the DOC pulse (it is necessary to adjust by means of VR to restrict the dispersion) due to the dispersion of the DC voltage of PIN ⑩, the output of Pin ⑩ is smoothed to be a reference voltage and compared by 1458 to produce

the pulse. For this reason the DOC pulse is not adjusted. R91 is for offsetting the reference voltage and so designed that the pulses are prevented from occuring unnecessarily. Unlike the DOC for chroma, the DOC pulse to be sent to SYSCON must be relatively wide, and therefore, it is rounded by C73. R92, also for offsetting, determines the output amount of the SYSCON DOC pulse. (Fig. 68).
The diode provided in the emitter, base of TR17 of chroma DOC is intended to prevent the DOC pulse from going to the chroma circuit under EE condition.

5) Double Limiter (1st Limiter)
The short wave length recording of PAL needs a double limiter to prevent the over modulation. The circuit consists of a high pass amplifier and a diode limiter. (Figs. 69, 70)

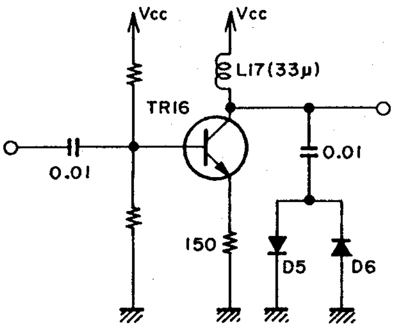


Fig. 69

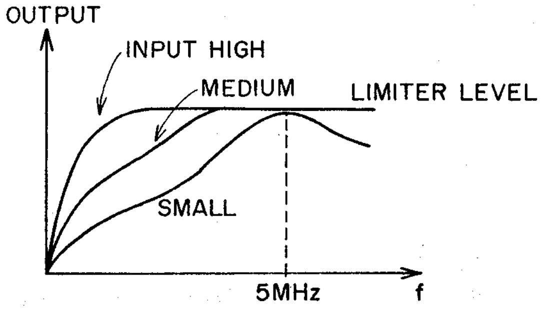


Fig. 70

6) PB Y LPF (LCB54, 55)
The characteristic of LCB54 and 55 is shown in Fig. 71, and they have the total delay time of 0.5 msec.

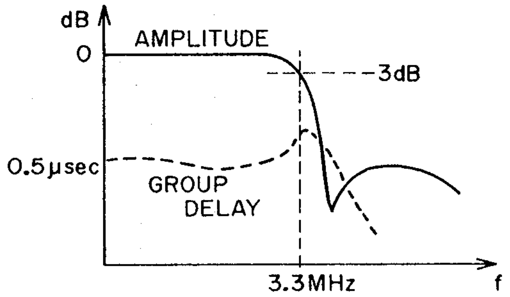


Fig. 71

7) De-emphasis
De-emphasis is the circuit shown in Fig. 72 and TR18 sets up the amplifier to determine PB Y level and the peaking through C84, L23 and R102. The de-emphasis consists of R104, R105 and C85//C86.
The peaking of C84, L23 and R102 is to increase the percentage modulation and raises about 2.3 MHz. This makes the video frequency characteristic in recording and regenerating almost flat.

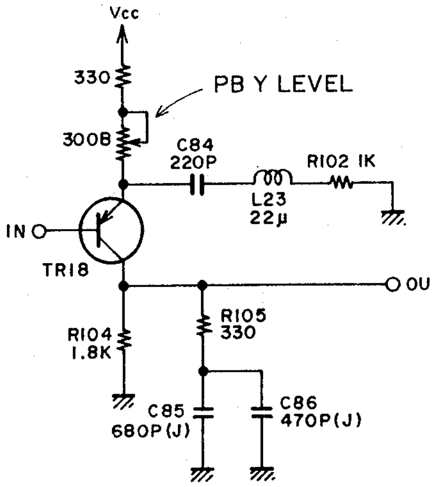


Fig. 72

8) Noise-Cancel
The noise cancel is shown in Fig. 73, and the regenerative video signal enters ⑫, and the one with the high part removed by R115 and C93 enters ⑪. After taking the difference between ⑫ and ⑪, those processed by the limiter are outputted to ⑬. Therefore, here come out the small level components in high band, especially those

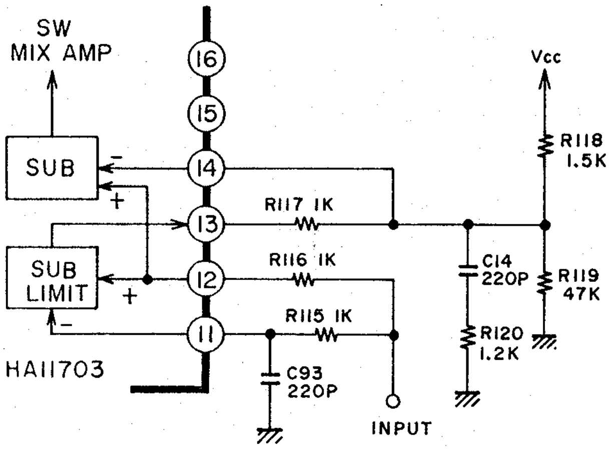

SW
MIX AMP
SUB
SUB LIMIT
HA11703
16
15
14
13
12
11
R117 1K
R116 1K
R115 1K
C93 220P
INPUT
Vcc
R118 1.5K
C14 220P
R119 47K
R120 1.2K

Fig. 73

containing much noise. (large level high band components are processed by the limiter and the amplitude is controlled). These are corrected slightly by the filter of R120, inputted in ⑭ and withdrawn from the input signal of ⑫. Thus the noise components only of the regenerative video signal are removed and the S/N is improved. The filters of C94 and R120 are to cancel noise components only and not to cancel the high band too much.

9) MIX, V. PULSE INSERTION, SW (EE/PB)
The video signal passing the noise cancel is mixed with the regenerative chroma signal ⑮ by HA11703 and switched to EE or PB by an electronic switch. This change-over is controlled by the

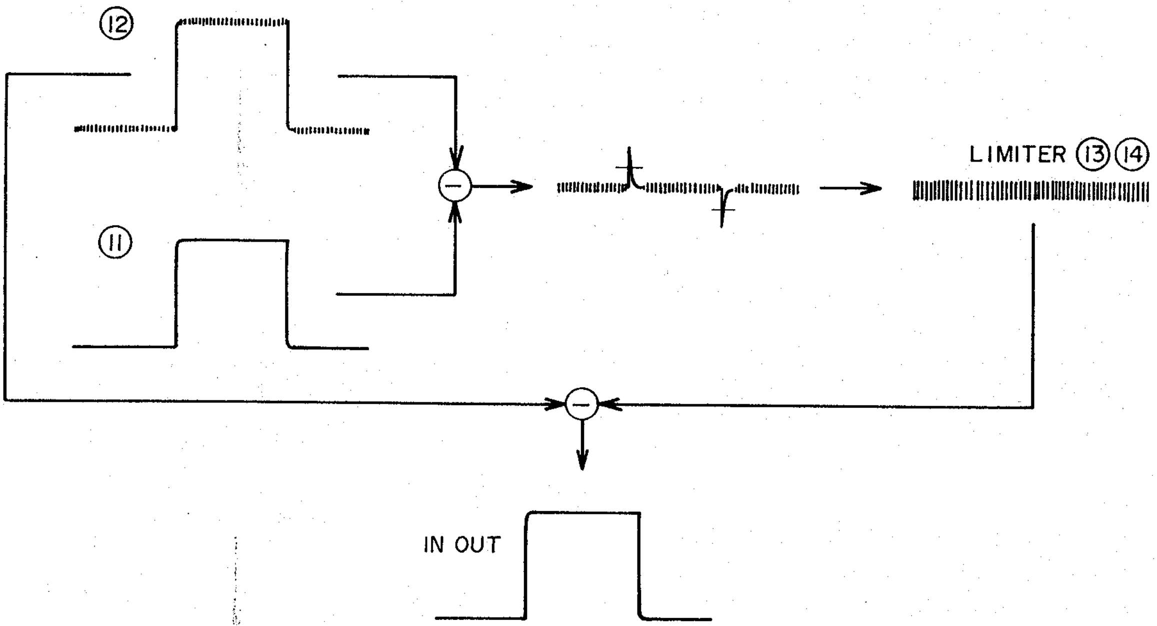

⑫
⑪
LIMITER ⑬⑭
IN OUT

Fig. 74

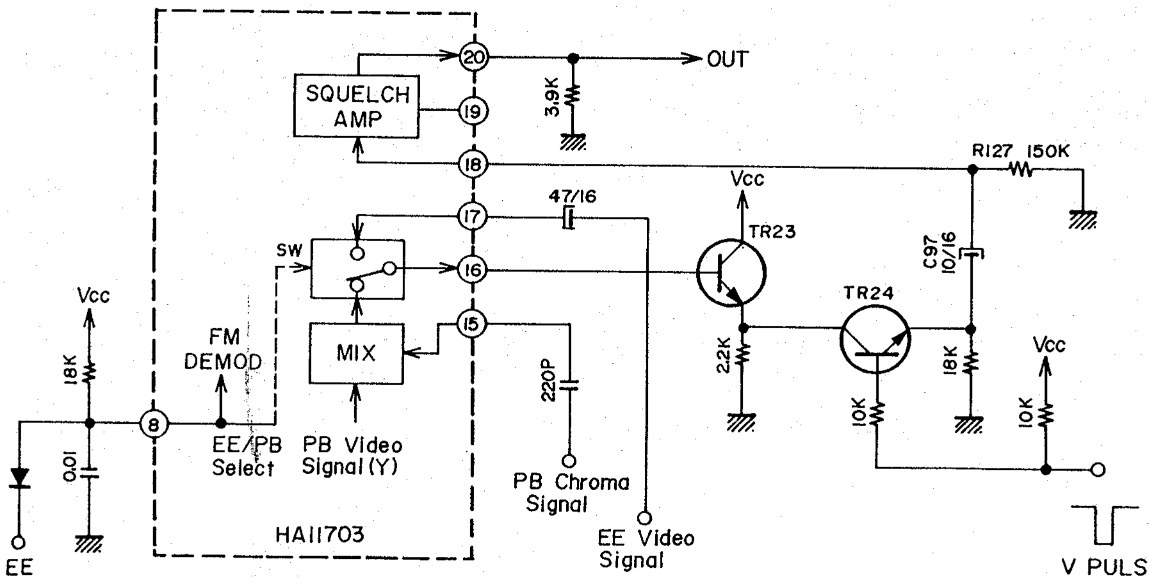

SQUELCH AMP
OUT
3.9K
R127 150K
Vcc
47/16
TR23
SW
C97 10/16
TR24
Vcc
18K
FM DEMOD
MIX
2.2K
18K
Vcc
220P
10K
10K
0.01
EE/PB Select
PB Video Signal (Y)
PB Chroma Signal
EE Video Signal
HA11703
EE
V PULSE
20
19
18
17
16
15
8

Fig. 75

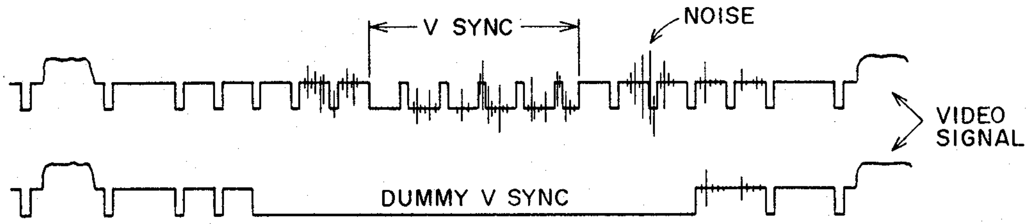

V SYNC
NOISE
VIDEO SIGNAL
DUMMY V SYNC

Fig. 76

voltage of Pin 8 (also the bias power source of FM demodulator). (Therefore, if the picture is not changed to PB in the play mode, it is necessary to check the voltage of EE). V. pulse (false pulse . . . In the case of STILL and varying speed regeneration, noise bar appears near the V. SYNC and V. SYNC tends to be disturbed. Therefore, the false V. SYNC is inserted forcefully. This is sent from SYSCON) is inserted by TR24.

When the V pulse is high, TR24 is turned ON, and the signal is normally transmitted. When it becomes low, TR24 is turned OFF, blanking is applied. Since Pin ⑱ of IC HA11703, C97 and R127 set up a clamp, when TR24 is OFF, it is fixed to the SYNC level.

Pins ⑱ ~ ⑳ are video amplifiers of 6 dB, and Pin ⑳ is about 2 Vp-p. The balance is outputted by TR25. (LINE OUT . . . VIDEO OUT-1).

10) RF Converter VIDEO OUT (VIDEO OUT-2)

The video signal to be sent to the RF converter is given a prescribed delay characteristic by the equalizer LCB-56. (Fig. 77)

C101 after LCB-56 raises the low band by sub-correction.

TR26 is received by EF and the emitter resistance by the RF converter side. When TEST OSC (described later) is ON, bias is applied through the diode and TR26 is turned OFF, and the TEST signal is transmitted to the RF converter.

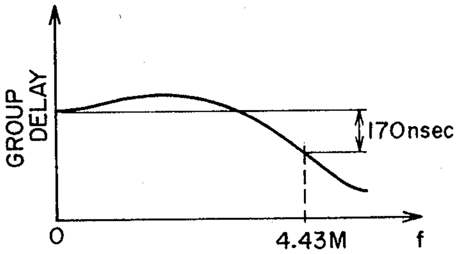


Fig. 77

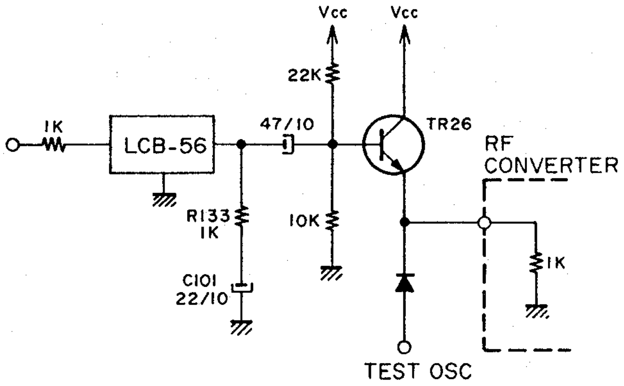

Vcc
Vcc
22K
1K
LCB-56
47/10
TR26
RF CONVERTER
R133 1K
10K
C101 22/10
1K
TEST OSC

Fig. 78

11) TEST OSC

TEST OSC issues the false signal to assist the TV side when it tries to search for the output of the RF converter.

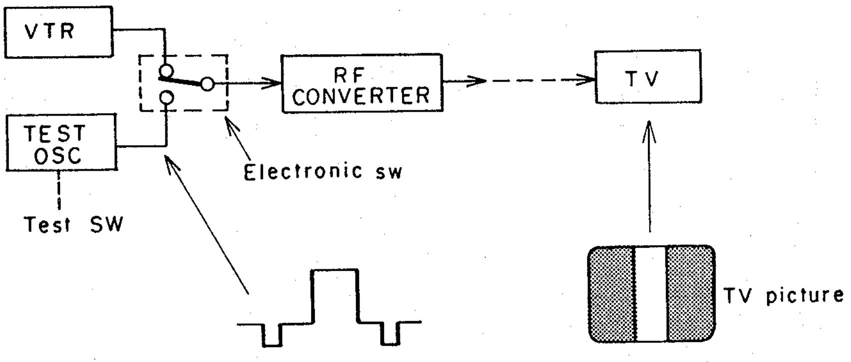

VTR
TEST OSC
Test SW
RF CONVERTER
TV
Electronic sw
TV picture

Fig. 79

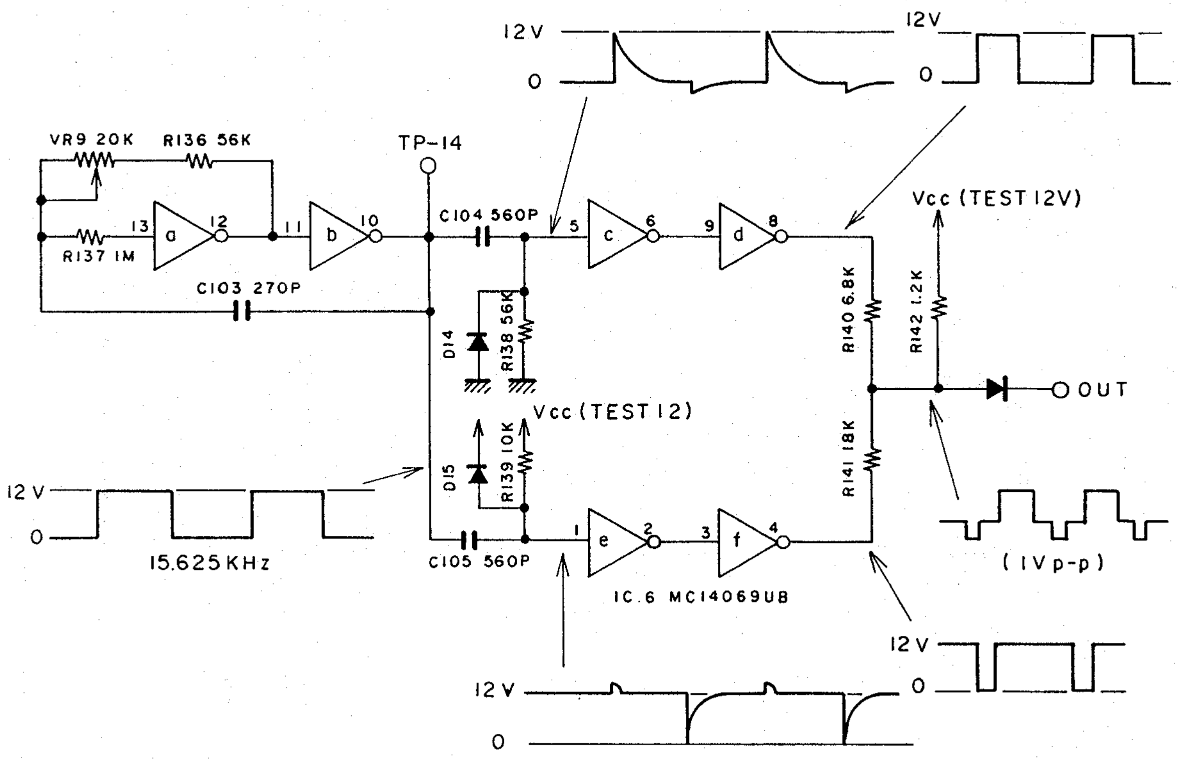

12V
0
12V
0
VR9 20K
R136 56K
TP-14
R137 1M
13
a
12
11
b
10
C103 270P
C104 560P
5
c
6
9
d
8
Vcc (TEST 12V)
R140 6.8K
R142 1.2K
D14
R138 56K
OUT
Vcc (TEST 12)
D15
R139 10K
R141 18K
12V
0
15.625KHz
C105 560P
1
e
2
3
f
4
IC.6 MC14069UB
(1Vp-p)
12V
0
12V
0

Fig. 80

The TEST OSC (Fig. 80) is operated when the TEST SW on the rear panel is turned ON and 12V is applied to the IC6 MC14069UB $V_{CC}$.
Firstly square waves are oscillated by the inverters a and b. The oscillation frequency is determined by C103, R136 and VR9, and adjusted to 15.625 kHz by VR9. Note that oscillation may not occur if the IC is not of un-buffer type, MC14069UB. Then, the frequency is differentiated and the pulses are shaped (inverters c, d, e and f) from ⊕ edge and ⊖ edge, and mixed by R140 and R141 to obtain the required waveform. The amplitude is determined by R142, bias is applied by Vcc, TR26 is turned OFF, and the TEST signal is sent to the RF converter.

## 4-2. Chroma Signal Circuit

Fig. 81 shows the block diagram of the chroma signal circuit.

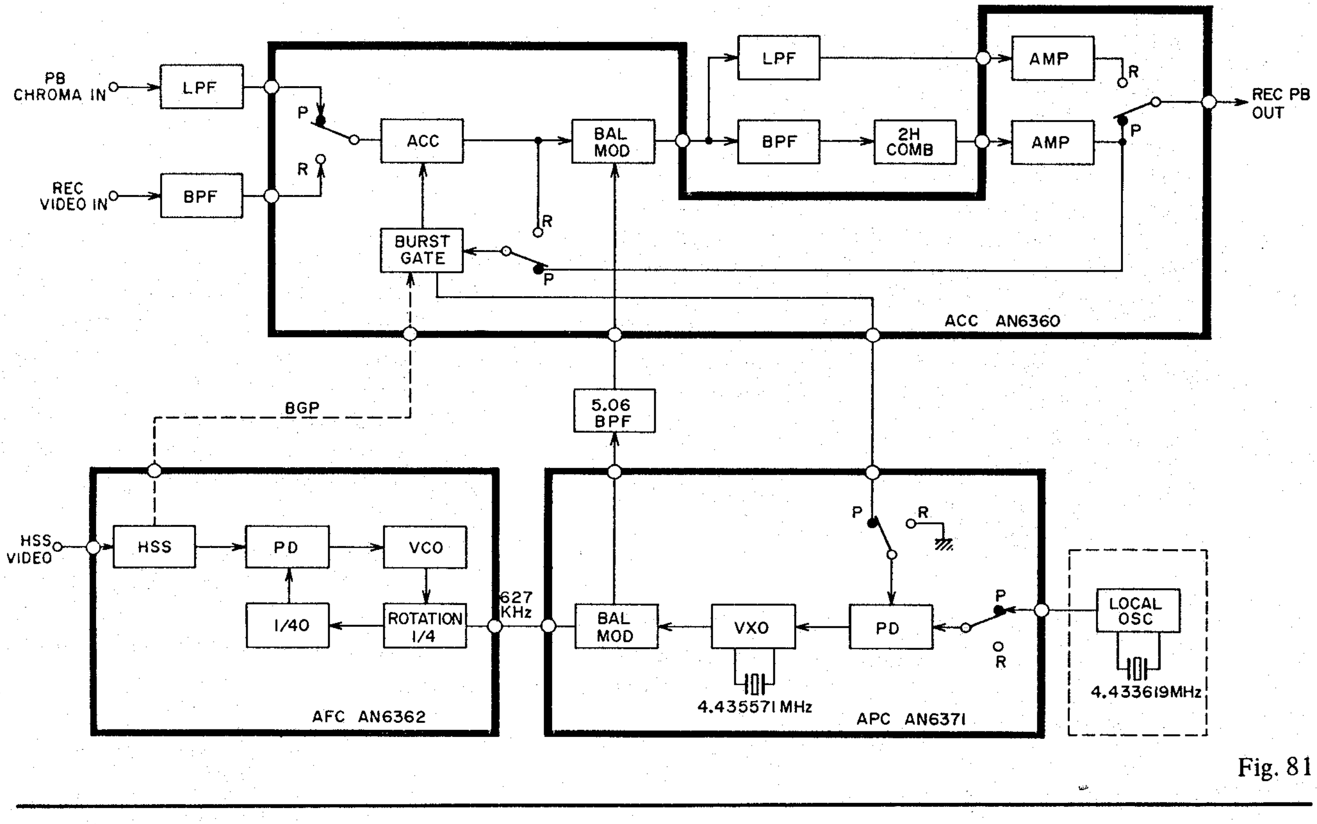

PB CHROMA IN
LPF
REC VIDEO IN
BPF
P
R
ACC
BAL MOD
BURST GATE
R
P
LPF
BPF
2H COMB
AMP
AMP
R
P
REC PB OUT
ACC AN6360
BGP
5.06 BPF
HSS VIDEO
HSS
PD
VCO
1/40
ROTATION 1/4
627 KHz
AFC AN6362
BAL MOD
VXO
4.435571MHz
PD
P
R
P
R
APC AN6371
LOCAL OSC
4.433619MHz

Fig. 81

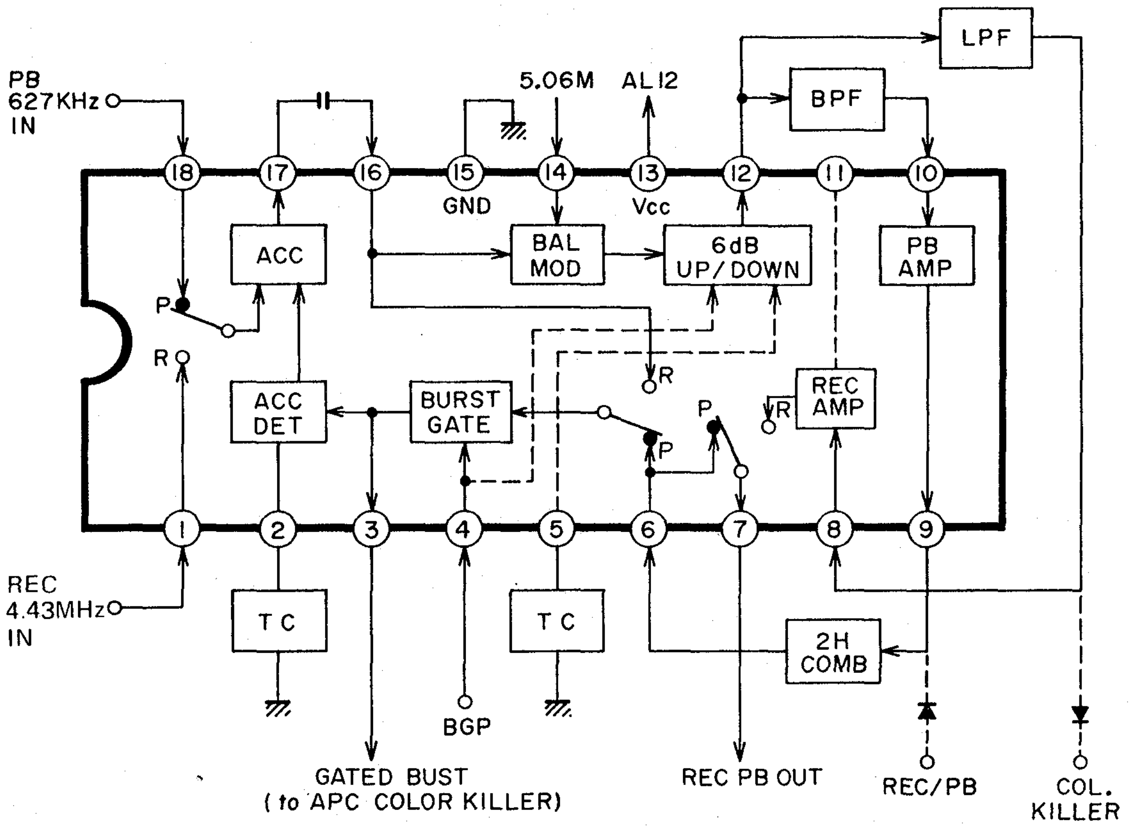

PB
627KHz
IN
5.06M
AL12
LPF
BPF
18
17
16
15
14
13
12
11
10
GND
Vcc
ACC
BAL MOD
6dB UP/DOWN
PB AMP
P
R
ACC DET
BURST GATE
REC AMP
1
2
3
4
5
6
7
8
9
REC
4.43MHz
IN
TC
TC
2H COMB
BGP
GATED BUST
(to APC COLOR KILLER)
REC PB OUT
REC/PB
COL. KILLER

Fig. 82

### 4-2-1. ACC

Fig. 82 shows the internal block diagram of ACC circuit.

The low chroma signal in PB and 4.43MHz signal in REC enter ⑱ and ① respectively, and after changed over by the switch, enter ACC. The switch of REC/PB is controlled by the voltage of Pin ⑨.

The time constant of ACC is determined by Pin ② and is detected by the burst level of the ACC output in REC and 2H comb filter output in PB. The ACC output ⑰ together with 5.06 MHz from ⑭ enters BAL MOD (balanced modulator), and after frequency converted, comes out to ⑫. The output ⑫ passes LPF (LCB-58) in REC and BPF (LCB-60) in PB and enters REC amplifier or PB amplifier. Then, the PB with the crosstalk removed by the comb filter enters ⑥ and is outputted to ⑦ after REC/PB switching. The output of chroma signal for both REC and PB comes out at Pin ⑦.

④ is B.G.P. input and at ③ the gated burst is outputted and sent to APC and color killer.

1) REC BPF LCB-57

REC BPF is to take out only 4.43MHz chroma signal from the video input signal. The characteristic is shown in Fig. 83, and the signal is received by EF (TR28) and put into AN6360 ①.

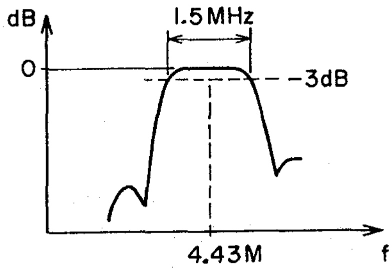


Fig. 83

2) PB LPF LCB-59

PB LPF is to take out the low converted chroma signal (low chrma) 627 kHz from the pre-amplifier output during PB and also adjust the phase relation between Y and chroma during PB. The characteristic is shown in Fig. 84 and it has the delay of 0.35 msec. After LCB-59, the signal is amplified by TR27. (about 200 mVp-p color bar at 6360 ⑱).

L, C and R in TR27 collector:

| | |
|---|---|
| L27, C109 . . . . | Trap to remove H periodic noise from TV, etc. |
| L28, C110 . . . . | 75 kHz audio bias trap (for sound dub) |
| R149, C108 . . . | CR for correcting frequency characteristic in REC and PB total |

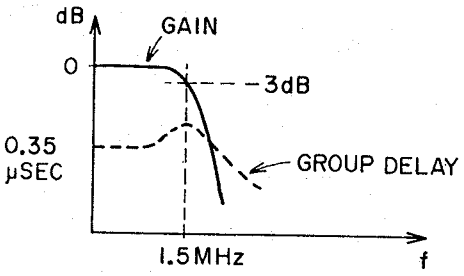


Fig. 84

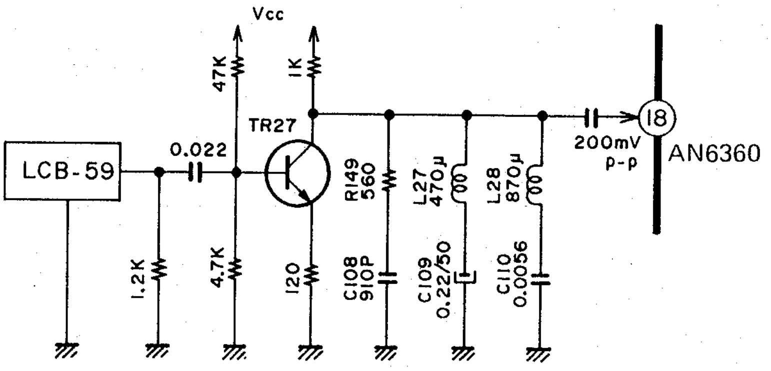

Vcc
47K
1K
TR27
0.022
LCB-59
200mV
p-p
18
AN6360
R149
560
L27
470µ
L28
870µ
1.2K
4.7K
120
C108
910P
C109
0.22/50
C110
0.0056

Fig. 85

3) ACC DET
The value of C is changed by TR29 so that the time constant of ACC will be fast in PB and relatively slow in REC.

4) REC LPF LCB-58
REC LPF LCB-58 is to take out only low chroma signal from the frequency converted signal (Pin ⑫), and the characteristic is shown in Fig. 86.
There is a C and R network in the vicinity of REC LPF as shown in Fig. 87, and it is to correct the frequency characteristic in PB and REC total (Same for R149 and C108 in the vicinity of PB LPF LCB-59) (Fig. 88)

Both CR networks are designed to stress the low band (eliminating the high band). The frequency characteristic of chroma is preferably flat at 4.43 MHz ± 500 kHz. When it is converted into the low chroma, it must be flat at 627 kHz ± 500 kHz. But the electromagnetic conversion characteristic of the head – tape system is 6 dB/oct and the higher the band, the larger the output, but when a certain level (around 1 MHz) is reached, the output becomes smaller due to the gap loss (Fig. 88 (b)). Therefore, it is necessary to correct this characteristic so that it becomes almost flat in REC and PB total. This is done by the C and R network in the vicinity of LPF of PB and REC.

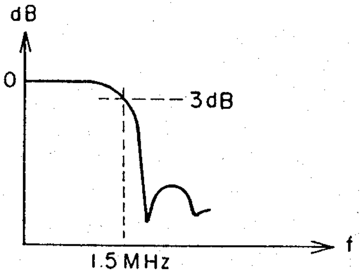


Fig. 86

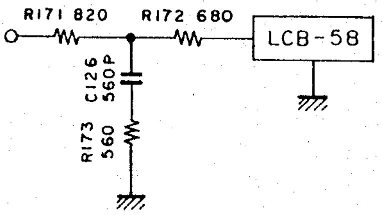

R171 820
R172 680
LCB-58
C126
560P
R173
560

Fig. 87

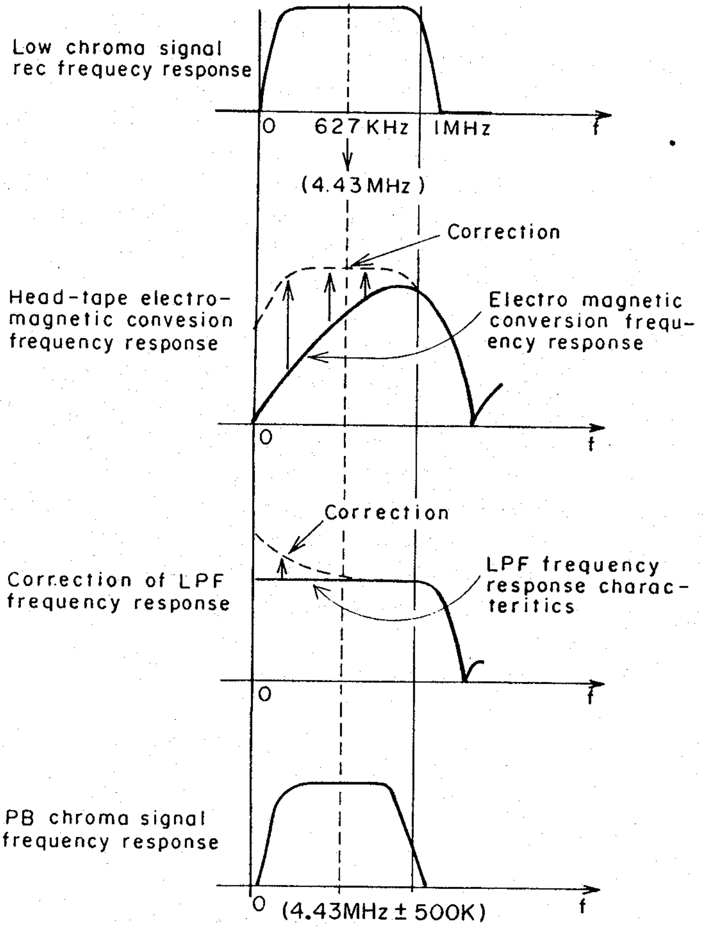


Fig. 88

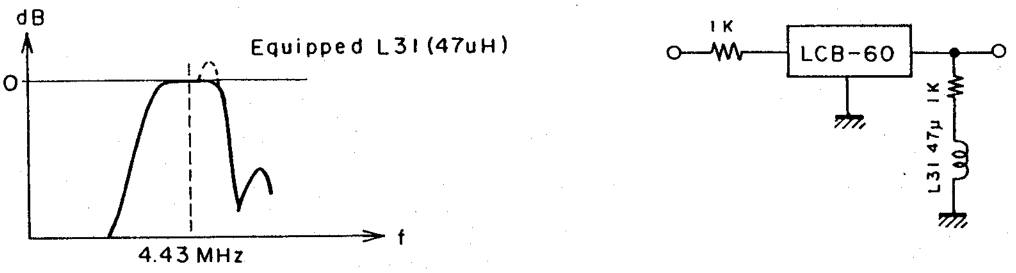


Fig. 89

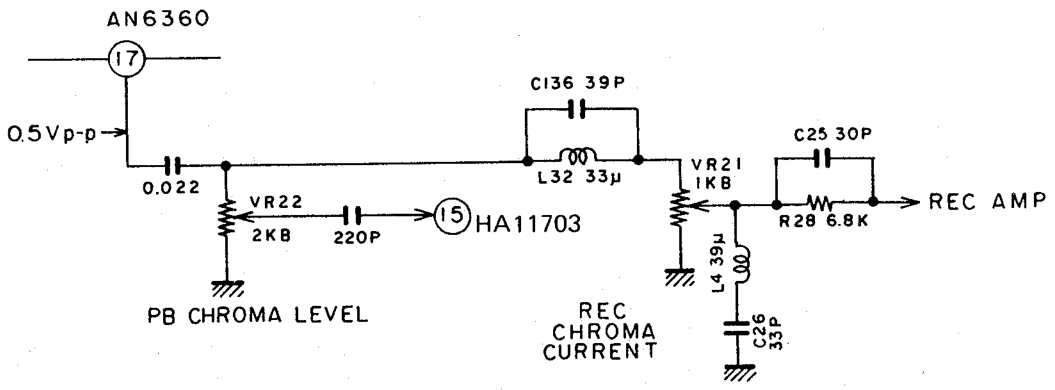


Fig. 90

5) PB BPF LCB-60

LCB-60 is to take out the chroma signal of 4.43 MHz from the output ⑫ of BAL MOD during PB. (Fig. 89). Here is also provided L31 (47 μ) behind the filter to correct the frequency characteristic same as above. (When 4.43 MHz is converted into low band, the band frequency is reversed in plus and minus. Therefore, the correction by L31 as in Fig. 89 is the correction in the same direction as the correction in Fig. 88.

6) PB, REC CHROMA OUT

The chroma is outputted from AN6360 ⑦ and the PB enters HA11703 ⑮ at VR22 and is mixed with Y. REC passes the traps of C136, L32 and L4, C26 and goes to REC AMP for mixing. These traps are intended to prevent the 4.43 MHz from returning to the pre-amplifier through the REC AMP during PB. The chroma recording current is shown in Fig. 91, and it is corrected by C25 (30p) to be flat.

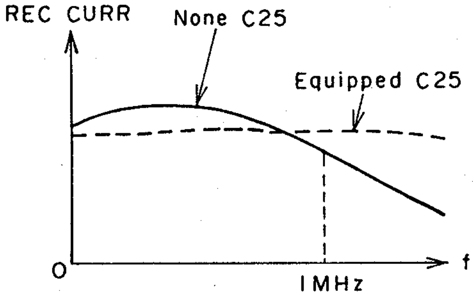


Fig. 91

### 4-2-2. AFC Circuit

Fig. 92 shows the internal block of IC AN6362 of AFC. Video signal for HSS (from VIDEO OUT TR25) from Pin ⑧ is entered through the filter. After amplified, it enters SYNC SEPA and the output comes from ③ and it will be the source of REF V (for servo). Also, HD pulse is outputted from ⑱ by the SYNC SEPA (→ BGP). SYNC enters AFC loop, and after rotation controlled, 625 kHz is outputted at ⑫. VCO output (1/160) of AFC is outputted at ④ as SFP (SYNC FRONT PULSE). This SFP and HD are sent to SYSCON to be used for the tuner searching (To judge whether it is the video signal or not). The frequency of SFP, if measured, naturally shows 15.625 kHz if AFC is locked. The time constant of AFC is governed by C and R of Pin ⑯, and the free run frequency is adjusted by VR24 of Pin ⑭ so that Pin ⑯ DC will be 4.6V when the video signal is inputted. (TP-31).

Pin ⑮ is to run the current (15 mA) for the internal $I^2$L logic circuit. Pin ① is the internal power source and Ⓒ for smoothing.

Fig. 93 shows the phase relationship among SYNC, HD and SFP of the input video signal. Pin ⑪ is for controlling the rotation.

90° phase delay at 0V, 90° phase advance at 2.5V and rotary stop at 6V. In PAL, CH1 is rotary stop and CH2 is 90° delay, so swing is made to 0 ~ 6V by SW pulse. In EGN, rotation of NTSC, so it is designed so that it can be changed to the swing at 0 ~ 2.5V.

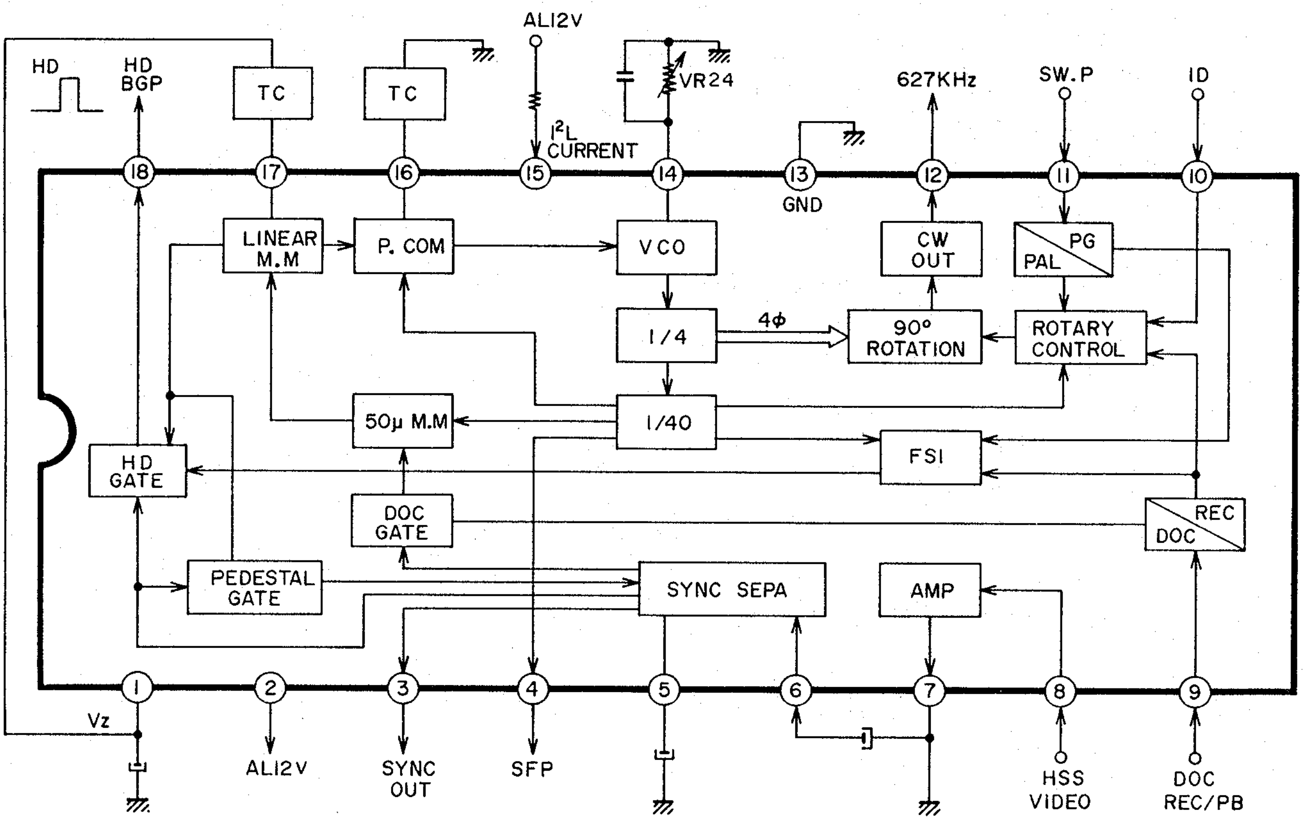

AL12V
HD
HD BGP
TC
TC
VR24
$I^2L$ CURRENT
627KHz
SW.P
ID
18
17
16
15
14
13
GND
12
11
10
LINEAR M.M
P. COM
VCO
CW OUT
PG
PAL
1/4
4Φ
90° ROTATION
ROTARY CONTROL
50μ M.M
1/40
FSI
HD GATE
DOC GATE
REC
DOC
PEDESTAL GATE
SYNC SEPA
AMP
1
2
3
4
5
6
7
8
9
Vz
AL12V
SYNC OUT
SFP
HSS VIDEO
DOC REC/PB

Fig. 92

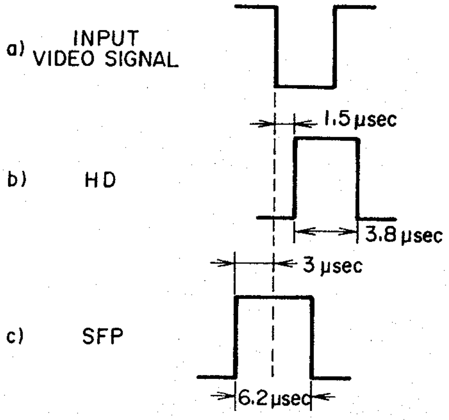

a) INPUT VIDEO SIGNAL
1.5 μsec
b) HD
3.8 μsec
3 μsec
c) SFP
6.2 μsec

Fig. 93

1) DOC Circuit

Since noise is produced during the drop-out if any, it is effective to have the function to prohibit AFC and HD. This function is provided by adding the DOC pulse to Pin ⑨. When a drop-out occurs, HD is prohibited as shown in Fig. 94, BGP disappears in the meantime, and the burst is not gated. Therefore, there will be less hue disturbance when the drop-out is removed.

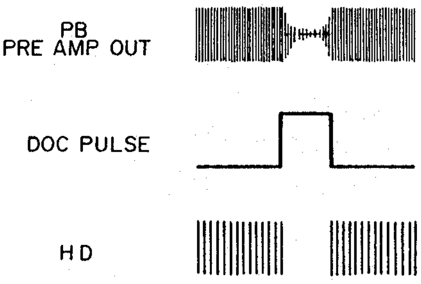

PB PRE AMP OUT
DOC PULSE
HD

Fig. 94

2) FSI Function

FSI is to inhibit HD for 7 ~ 8 hours after V SYNC as shown in Fig. 95. This is to prevent the hue disorder due to the skew in the first field part.

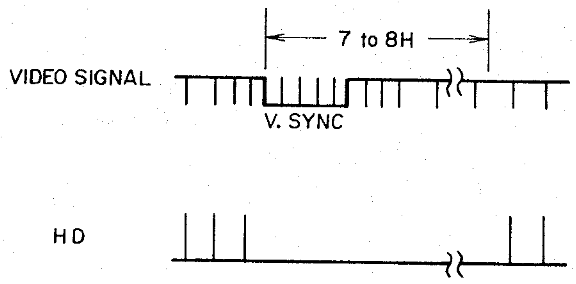

7 to 8H
VIDEO SIGNAL
V. SYNC
HD

Fig. 95

That is, it inhibits APC (burst is not gated) while AFC is not stable and actuates APC when it becomes stable. This only functions during PB and during REC, change-over is made by applying the voltage to Pin ⑨.

3) HSS Video Filter

Pin ⑧ video for HSS is inputted after chroma, noise and other are removed by the filter as shown in Fig. 96. This affects the characteristic of AFC.

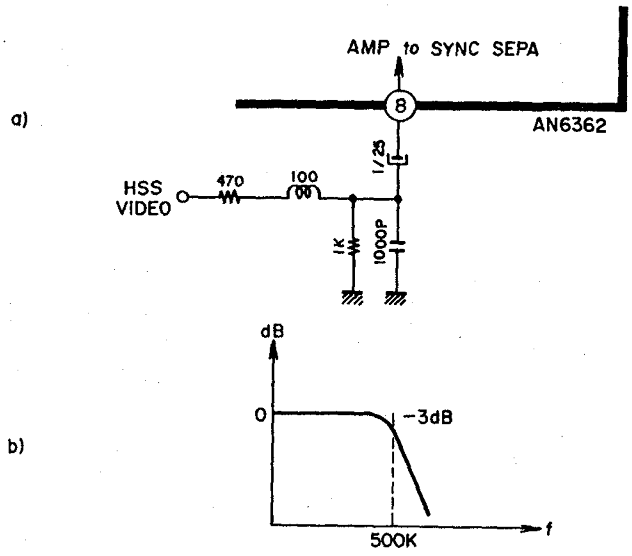

a)
AMP to SYNC SEPA
8
AN6362
1/25
HSS VIDEO
470
100
1K
1000P
b)
dB
0
-3dB
500K
f

Fig. 96 HSS Video Filter

4) BGP

Burst gate pulse is produced from HD as shown in Fig. 97.

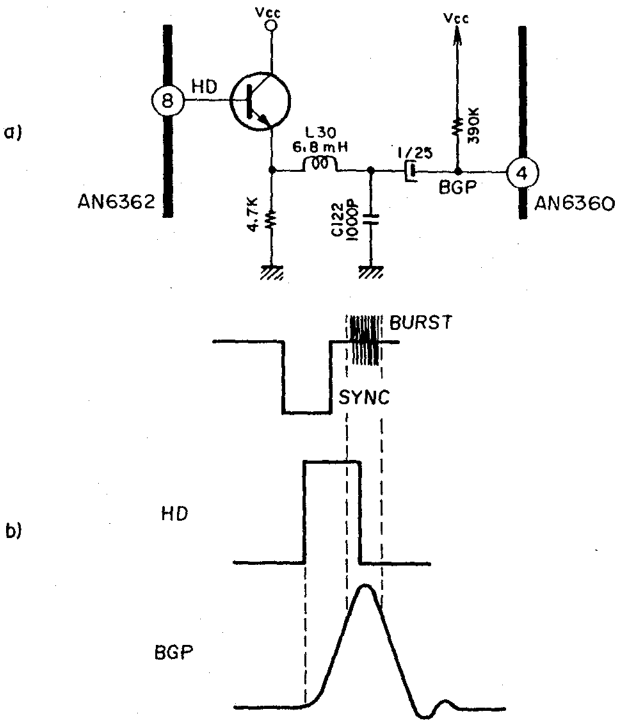

a)
Vcc
Vcc
8
HD
L30
6.8mH
1/25
390K
4
BGP
AN6362
AN6360
4.7K
C122
1000P
BURST
SYNC
b)
HD
BGP

Fig. 97

4-2-3. APC

Fig. 98 shows the internal block of IC AN6371 of APC.

APC makes phase comparison between the burst signal from ⑬ and 90° shifted signal of ⑭ and

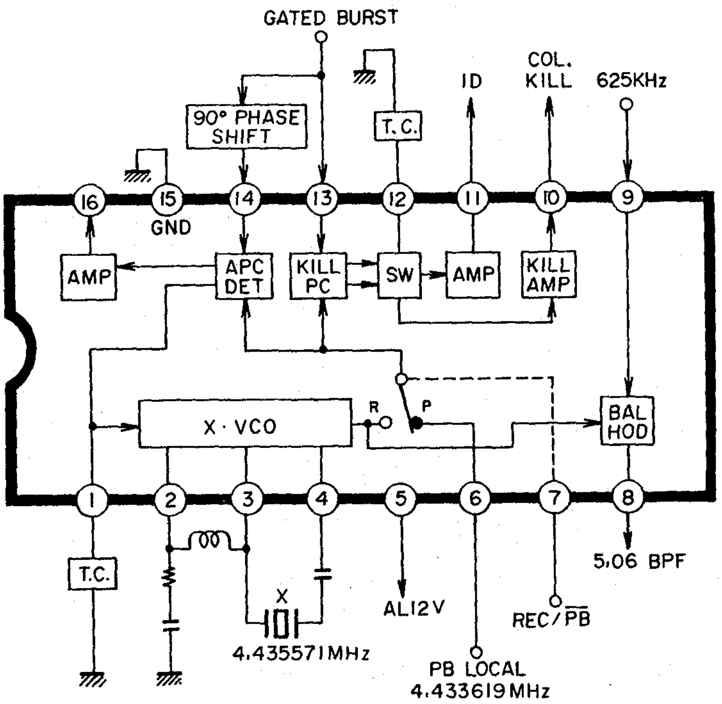

GATED BURST
90° PHASE SHIFT
T.C.
ID
COL. KILL
625KHz
16
15
GND
14
13
12
11
10
9
AMP
APC DET
KILL PC
SW
AMP
KILL AMP
X·VCO
R
P
BAL HOD
1
2
3
4
5
6
7
8
T.C.
X
4.435571MHz
AL12V
PB LOCAL 4.433619MHz
REC/PB
5.06 BPF

Fig. 98

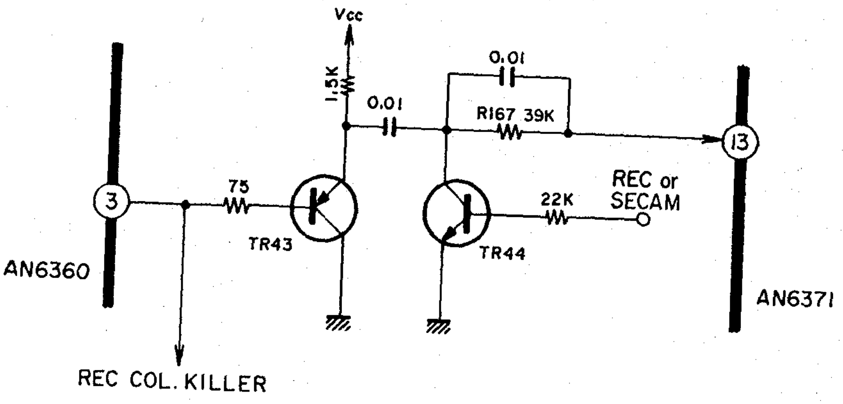

Vcc
1.5K
0.01
0.01
R167 39K
75
TR43
22K
REC or
SECAM
TR44
AN6360
AN6371
REC COL. KILLER
3
13

Fig. 99

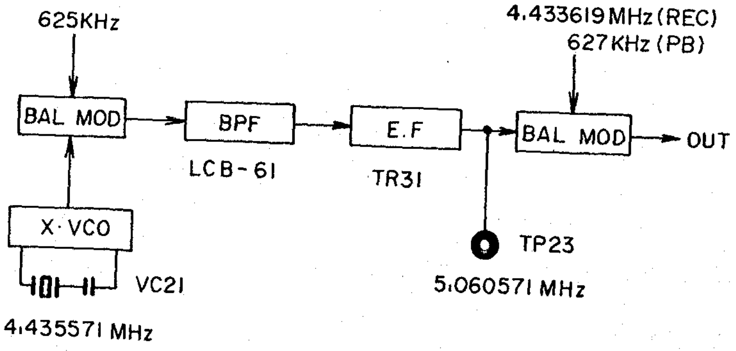

625KHz
4.433619MHz(REC)
627KHz(PB)
BAL MOD
BPF
E.F
BAL MOD
OUT
LCB-61
TR31
X·VCO
VC21
4.435571 MHz
TP23
5.060571 MHz

Fig. 100

VCO output (in REC) or LOCAL 4.43 MHz (in PB) Pin ⑥. REC/PB is controlled by the voltage of Pin ⑦. (it is necessary to lower the voltage under 0.7V during PB). The time constant of APC is governed by ①. Since APC is not locked (4.433619 MHz and 4.435571 MHz) during REC in PAL, the fixed oscillation is achieved by not inputting the burst.

⑫ is the time constant of the killer and APC color killer is outputted at Pin ⑩ (DC10V fro color, 0 for B/W). If there is no burst input (no signal), this output becomes high. ⑪ is ID output.

The sub-converter (BAL MOD) balance-modulates 625 kHz from AN6362 (AFC) through ⑨ and 4.43 MHz of VCO and outputs them to ⑧.

1) Burst Input Circuit

The gated burst of AN6360 ③ is transmitted to APC (AN6371) but since in PAL, APC is not locked during REC, the burst is cut and 4.43M (4.435571 MHz) is oscillated fixed. During REC and SECAM (also fixed oscillation in EG, SECAM), TR44 is turned ON to cut the burst. R167 39K is to secure the R167 39K is to secure the oscillation.

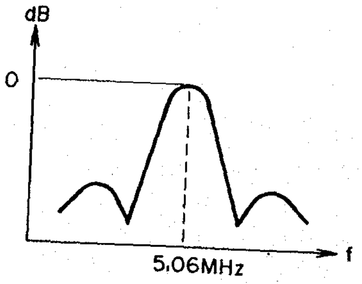


Fig. 101

2) 5.06 MHz BPF

The VCO oscillation frequency in REC is adjusted by the frequency of 5.06 MHz of TP23. In such a case, if 625 kHz is phase rotated, the correct frequency can not be measured, and therefore, the rotation is stopped (SECAM MODE) and the adjustment is made by VC21 so as to achieve 5.06057 (4.435571 MHz + 625 kHz) Hz. This VC21 can be adjusted through the hole of the front display PCB and TP23 can also be fine-adjusted in line because the connector is exposing.

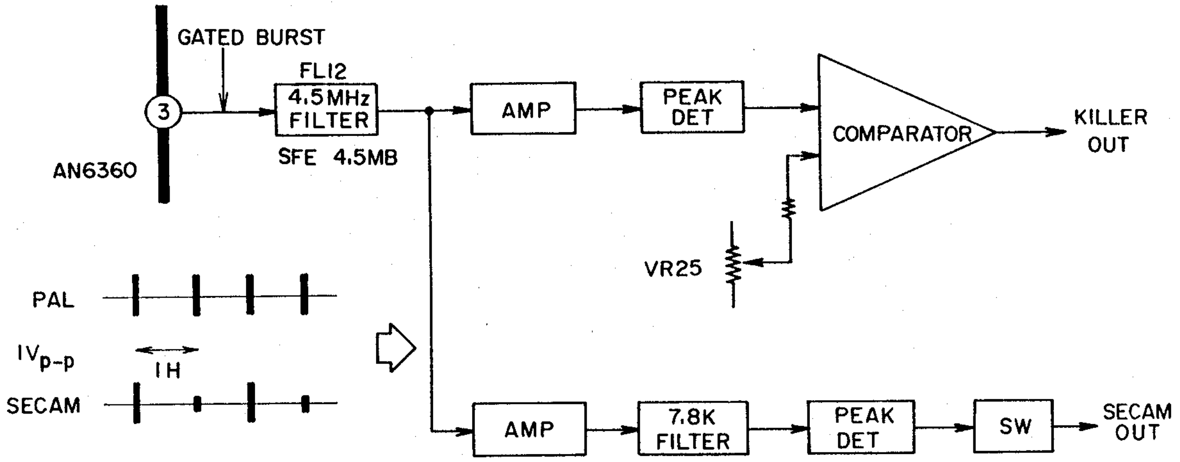
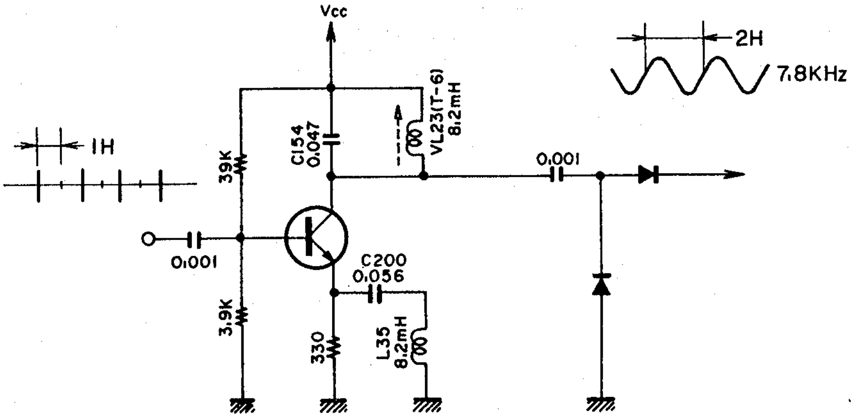

GATED BURST
FL12
4.5MHz FILTER
SFE 4.5MB
3
AN6360
AMP
PEAK DET
COMPARATOR
KILLER OUT
VR25
PAL
1Vp-p
1H
SECAM
AMP
7.8K FILTER
PEAK DET
SW
SECAM OUT

Fig. 102


Vcc
1H
39K
0.001
3.9K
C154 0.047
VL23(T-6) 8.2mH
0.001
C200 0.056
330
L35 8.2mH
2H
7.8KHz

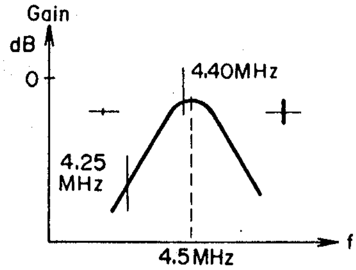


Fig. 104

Fig. 103

### 4-2-4. REC Color Killer and SECAM Detector

In PAL the color killer cannot be used because APC is not locked during REC, and the color killer must be provided especially for REC.

VS-5 uses the color killer of level detection system. The gated burst passes the ceramic filter of 4.5 MHz and enters the color killer and SECAM detector. This filter removes noise in PAL (level difference between B/W and PAL is increases) and produces the level difference per one hour (7.8 kHz) in SECAM. This is amplified by the color killer, peak detected by two diodes and compared by IC11 (MPC741C). The reference is adjusted by VR25. The reference should be −12 dB in 75% color bar (level where the monitor becomes B/W). Since the carrier frequency of SECAM signal is changing to 4.40 MHz and 4.25 MHz every one hour, the amplitude per one hour (7.8 kHz) is taken out by utilizing the slope of the 4.5MHz ceramic filter and identified. In VS-5, the LC peaking is also put into the emitter to increase the level of 7.8 kHz. This assured that the level ratio between PAL and SECAM is more than 20 dB even during PB. VL23 adjusts the resonance frequency of L and C so that 7.8 kHz will be maximum during SECAM. SECAM DET is not needed by EK. During SECAM (EG SECAM), the SECAM detector output (high in SECAM, low in PAL and B/W) controls the following.

a) Stops rotation

Since the phase rotation is not carried out both for REC and PB in SECAM, Pin ⑪ of AN6362 (AFC) is made high (6 ~ 7V) by D27 to stop the rotation.

b) Cuts 2H delay

Since there is no need of passing this because of no rotation and no possibility of removing the crosstalk, TR32 is turned OFF by D19.

c) Fixes the VCO oscillation of APC

In principle, APC is not needed because SECAM is FM, and fixed frequency can be oscillated. Therefore, like in REC, the burst input of AN6371 is cut by TR44.

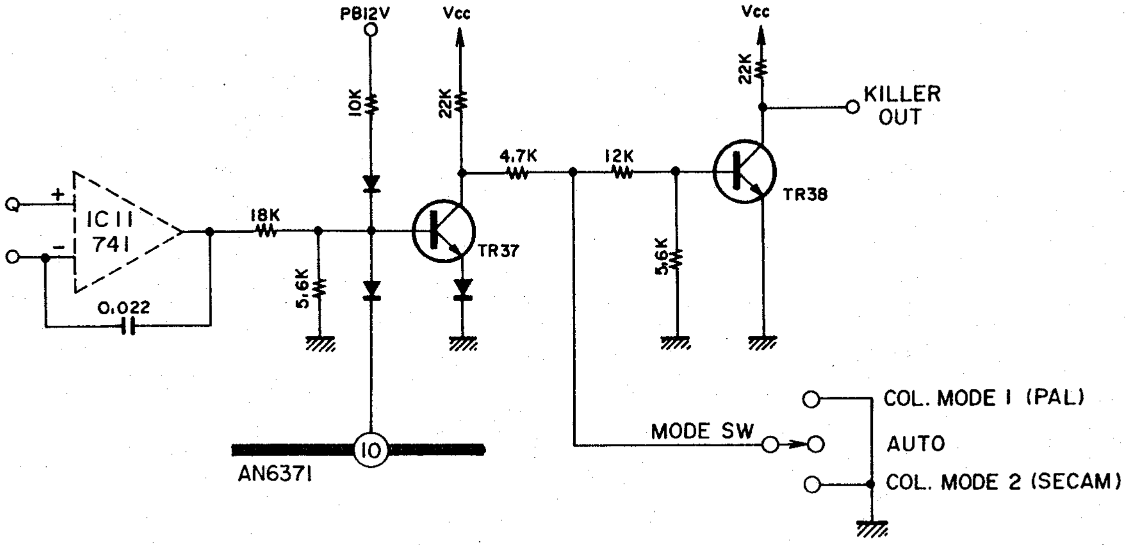

PB12V
Vcc
Vcc
10K
22K
22K
KILLER OUT
4.7K
12K
IC11
741
18K
TR37
TR38
5.6K
5.6K
0.022
MODE SW
COL. MODE 1 (PAL)
AUTO
COL. MODE 2 (SECAM)
10
AN6371

Fig. 105

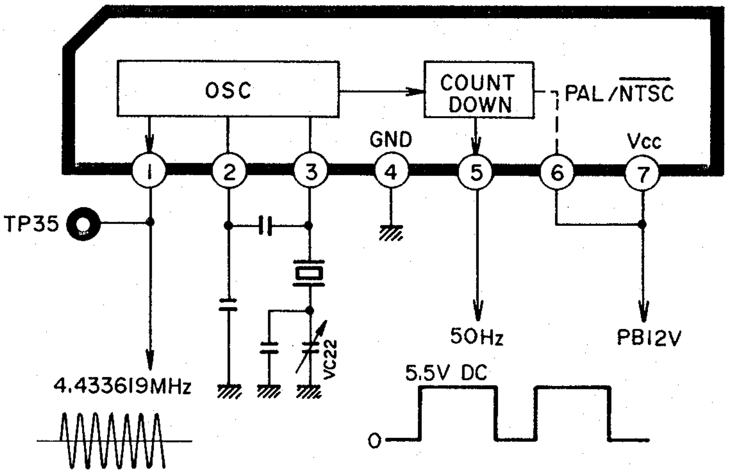

OSC
COUNT DOWN
PAL/$\overline{\text{NTSC}}$
GND
Vcc
1
2
3
4
5
6
7
TP35
4.433619MHz
VC22
50Hz
PB12V
5.5V DC
0

Fig. 106

1) REC and PB Color Killer Change-over
Change-over is necessary because REC uses the level detector and PB uses the killer of APC as aforementioned, and also needed is the control circuit by forced mode SW. This is the circuit shown in Fig. 105. (in SECAM, the APC killer is not locked and becomes Low but SECAM DET cuts the burst and as a result, the APC killer becomes High.)

2) Mode SW
VS-5 has a mode SW (3 positions) on its rear panel which can achieve the mode change such as "forced PAL", "AUTO" and "forced SECAM". This was selected by considering the malfunction problem of the SECAM detector and the fact that the TV is watched far often in color than in B/W.

3) 4.433619 MHz Local OSC
Fig. 106 shows the internal block of AN6342N. This IC is to output PB4.43MHz FIX LOCAL OSC and 50 Hz for servo reference (reference V). 50 Hz is obtained by dividing 4.43 MHz (1/88672).
The oscillator frequency is adjusted by VC22 to 4.433619 MHz.

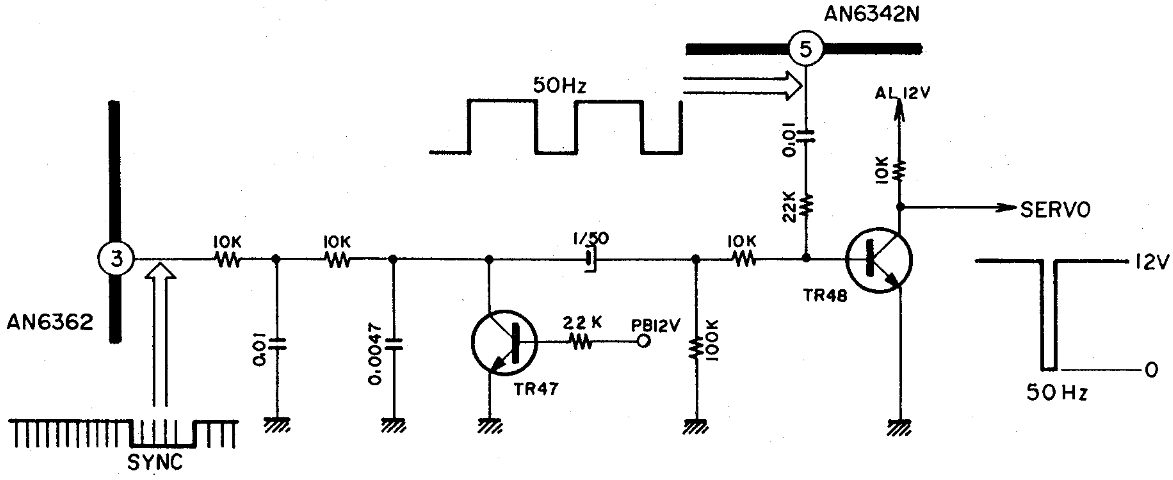

AN6342N
5
50Hz
AL 12V
0.01
10K
22K
SERVO
12V
3
10K
10K
1/50
10K
TR48
AN6362
0.01
0.0047
22K
PB12V
100K
TR47
50 Hz
0
SYNC

Fig. 107

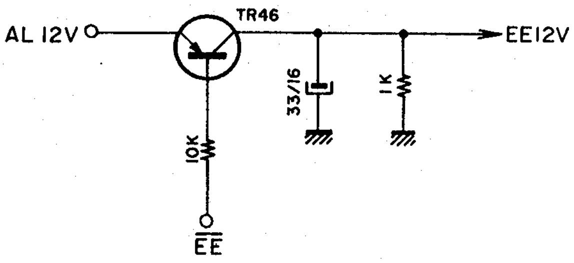

AL 12V
TR46
EE12V
33/16
1K
10K
$\overline{EE}$

Fig. 108

4) REF V Circuit

As the reference signal of Servo, it is necessary to send V of input video signal in REC and the accurate 50 Hz pulse in PB.

The video signal V is taken out by integrating the SYNC of AN6362 ③ or produced from 50 Hz of AN6342N in PB and switched by TR47 and 48 to be sent to the servo.

5) EE12V

The control line $\overline{\text{EE}}$ comes from the SYSCON, but the video circuit uses EE12V which is obtained through the TR46 switching. (Fig. 108)

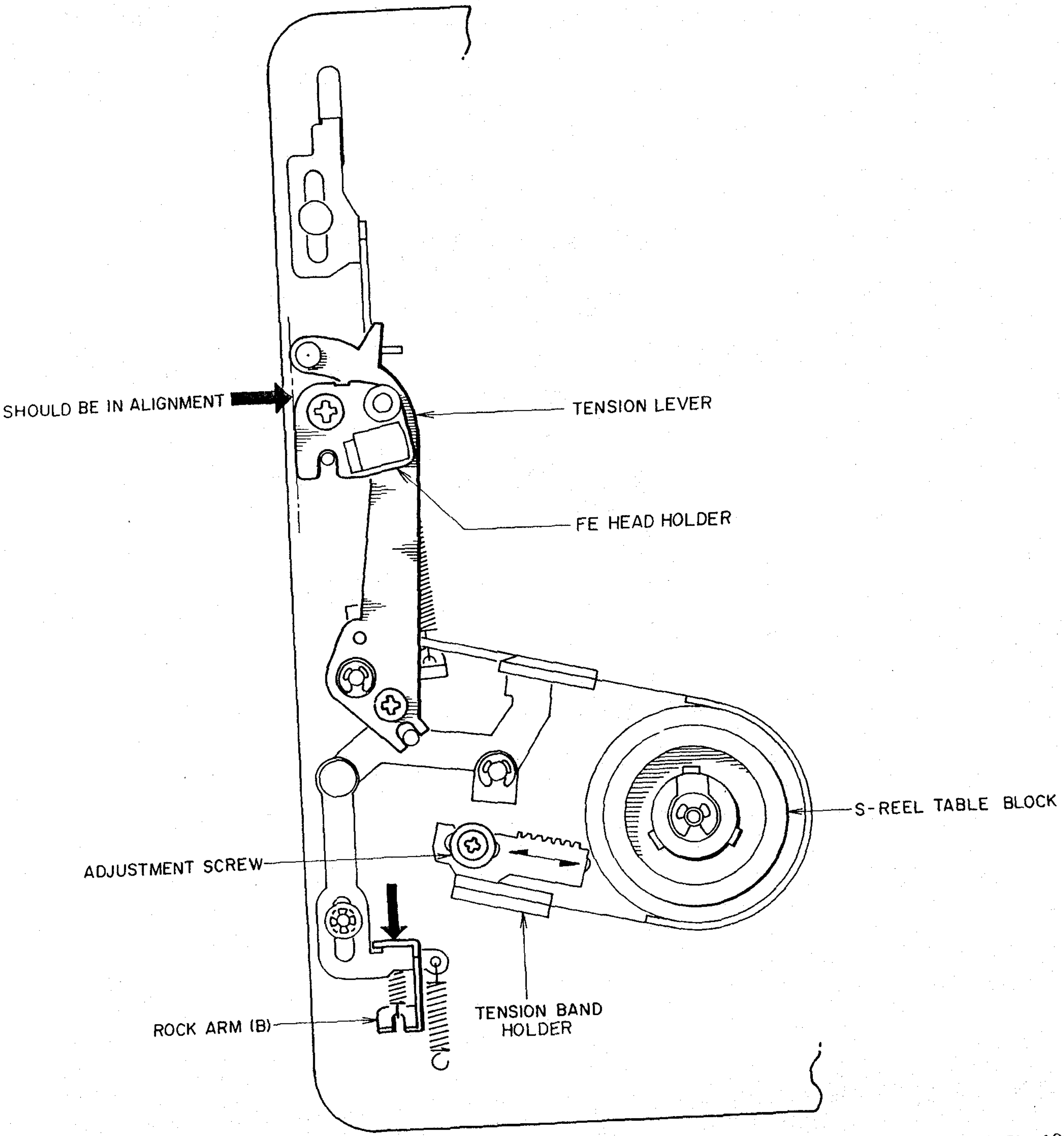

SHOULD BE IN ALIGNMENT
TENSION LEVER
FE HEAD HOLDER
S-REEL TABLE BLOCK
ADJUSTMENT SCREW
ROCK ARM (B)
TENSION BAND HOLDER

Fig. 109

## 1. TENSION LEVER POSITION ADJUSTMENT (Refer to Fig. 109)

1) Place the cassette holder in EJECT position.
2) Cover the detector lamp with a tape, etc. so that no light will leak.
3) Press the rock arm (B) in the arrow direction, and achieve PLAY mode.
4) Switch OFF the power switch on the rear panel and maintain the loading position.
5) Loosen the adjustment screw and adjust the tension band holder so that the tension lever and FE head holder are in alignment as shown in Fig. 109, and tighten the adjustment screw.
6) After adjustment, paint-lock the adjustment screw.

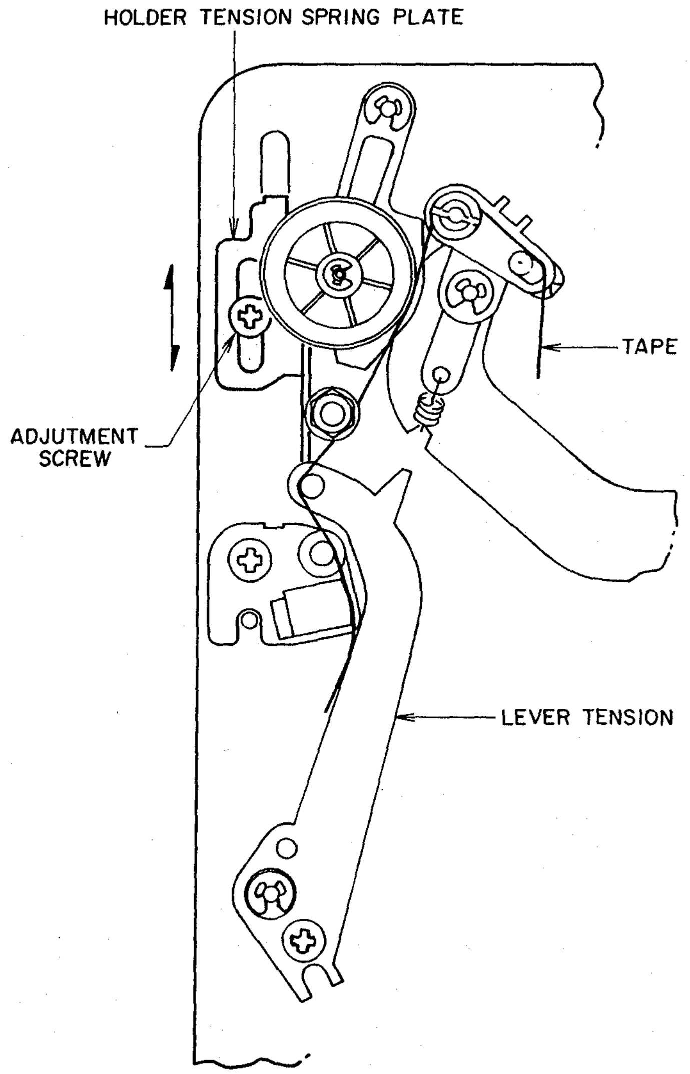

HOLDER TENSION SPRING PLATE
TAPE
ADJUTMENT SCREW
LEVER TENSION

Fig. 110

## 2. BACK TENSION ADJUSTMENT (Refer to Figs. 110, 111)

1) Set the back tension adj. jig (BT-001) shown in Fig. 111 and achieve PLAY mode.
2) Loosen the adjustment screw shown in Fig. 110, adjust the holder tension spring plate so that back tension will be 20 gf-cm, and tighten the adjustment screw.
3) After adjustment, paint-lock the adjustment screw.

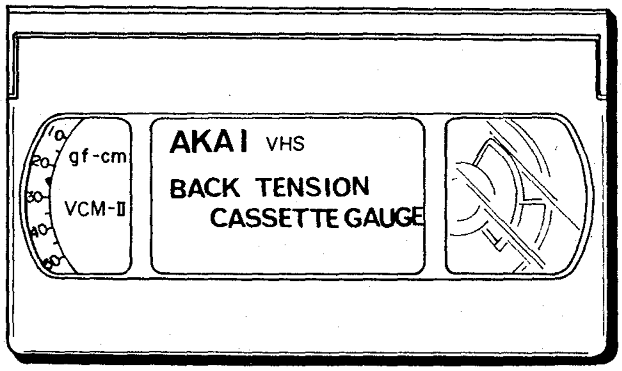

gf-cm
VCM-II
10
20
30
40
60
AKAI VHS
BACK TENSION
CASSETTE GAUGE

Fig. 111

## 3. CHECKING THE VARIOUS TORQUES
(Refer to Figs. 112, 113)

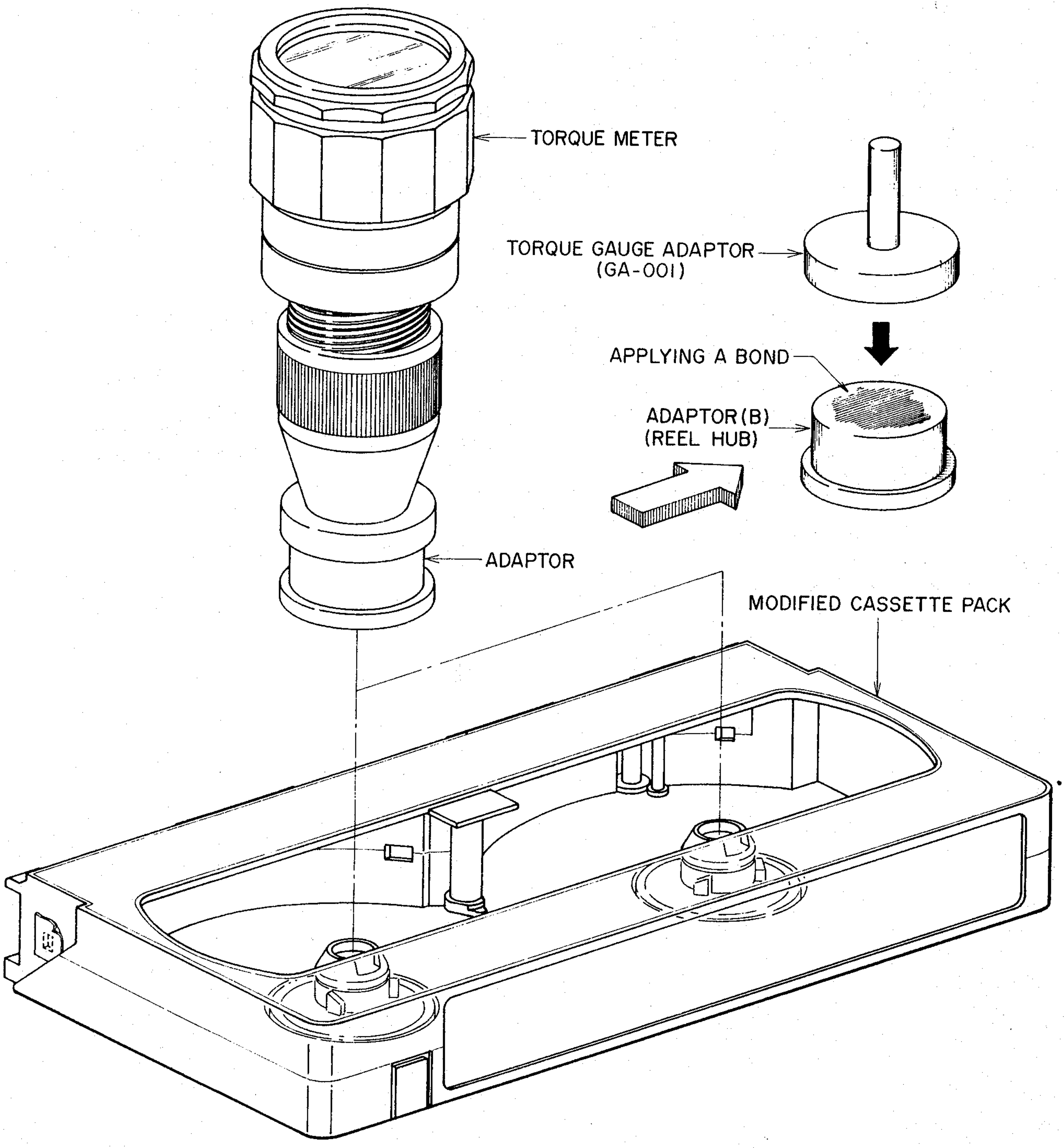

TORQUE METER
TORQUE GAUGE ADAPTOR (GA-001)
APPLYING A BOND
ADAPTOR(B) (REEL HUB)
ADAPTOR
MODIFIED CASSETTE PACK

Fig. 112

| Measuring Item | Mode | Measuring Point | Result |
|---|---|---|---|
| PLAY Torque | PB | Take-up Reel | $120^{+60}_{-40}$ g.cm |
| FF Torque | FF | Take-up Reel | More than 400 g.cm |
| REW Torque | REW | Supply Reel | More than 400 g.cm |
| Cue Torque | Cue | Take-up Reel | $120^{+60}_{-40}$ g.cm |
| Review Torque | Review | Supply Reel | $200^{+50}_{-40}$ g.cm |
| Unloading Torque | PB → STOP | Supply Reel | $120^{+60}_{-40}$ g.cm |

Fig. 113

**NOTE:**
1. The unloading torque operation is in three stages so finally, check that during unloading the tape is winding into the cassette pack correctly.
2. A modified cassette pack is shown in Fig. 112. The upper side of the cassette pack has been cut away and the tape taken out.
   There is black tape inside the pack to prevent light from the start and end sensors. This modified pack is very useful in checking in each mode so we recommend you make your own from a defective cassette pack.
   This modified cassette pack is not available from Akai.
3. (How to make a Torque Gauge Adapter)
   Adapter (B) is not supplied by Akai so make one by removing the reel hub of the VHS cassette tape E-120.
   Use after fixing the adapter (B) to the Torque gauge adapter (GA-001).

# VIII. REPLACEMENT OF VIDEO HEAD ASSEMBLY

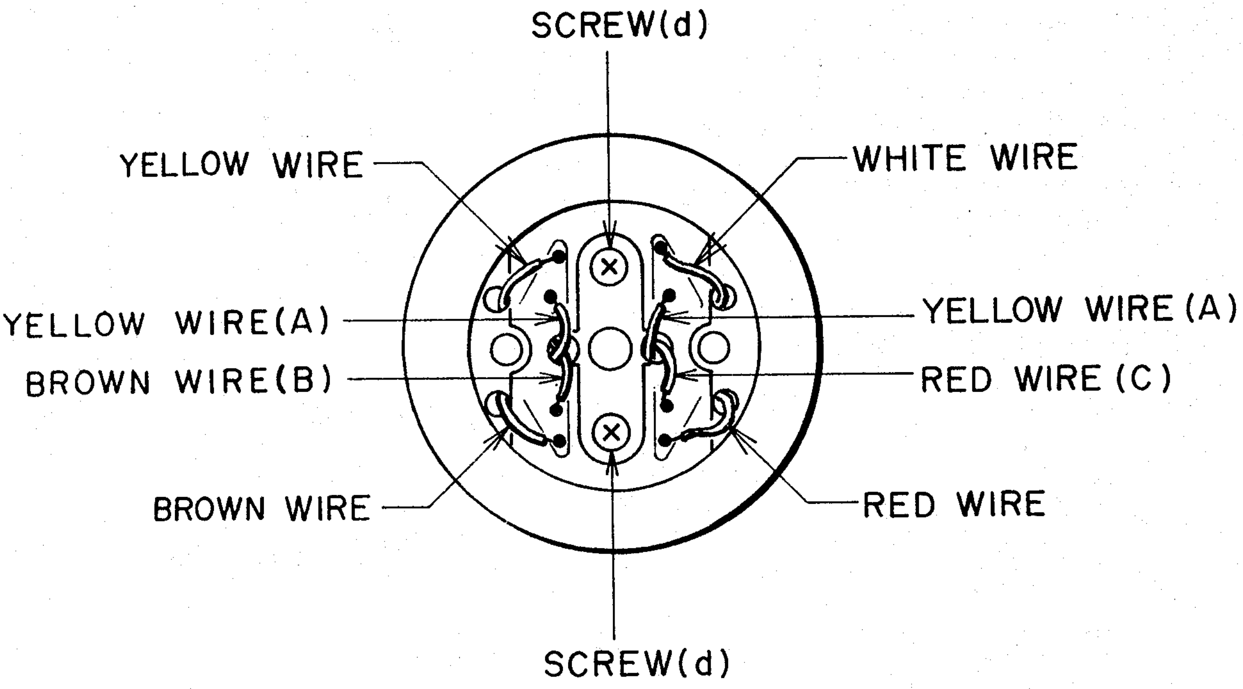

SCREW(d)
YELLOW WIRE
WHITE WIRE
YELLOW WIRE(A)
YELLOW WIRE (A)
BROWN WIRE(B)
RED WIRE (C)
BROWN WIRE
RED WIRE
SCREW(d)

Fig. 114 Replacement of Video Head Assembly

1. Unsolder the wire (A), then unsolder the brown wire (B) and red wire (C).
2. Remove the two screws (d), then pull up the upper drum assembly.
3. Install the new head assembly and solder the wires as shown in Fig. 114.
4. Fasten two screws (d).
5. After replacement, the following adjustments are necessary.
    1) PB Tracking Adjustment (Servo P.C Board Step 4)
    2) PB Switching Point Adjustment (Servo P.C Board Step 5)
    3) REC Switching Point Adjustment(Servo P.C Board Step 6)
    4) Video Head Q (Quality factor) and resonance Adjustment (Video P.C Board Step 9)
    5) PB Y Level Adjustment (Video P.C Board Step 10)
    6) PB Chroma Level Adjustment (Video P.C Board Step 12)

# IX. TAPE TRANSPORT ADJUSTMENT

## 1. TAPE GUIDE HEIGHT ADJUSTMENT

1) Set the cassette tape and achieve PLAY mode.
2) Make adjustment with the supply guide height adjustment nut so that the lower part of the tape will pass the lower part of the guide pole without curling as shown in Fig. 115.
3) Make the same adjustment as that in 2) wih the take-up guide height adjustment nut.

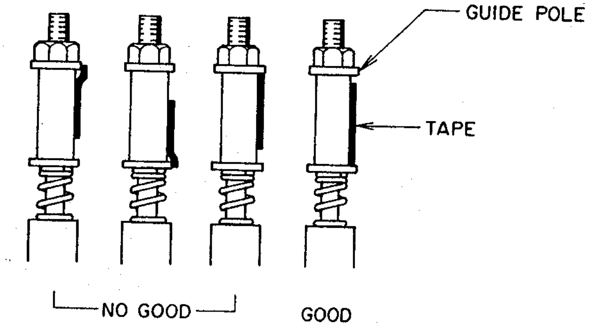

GUIDE POLE
TAPE
NO GOOD
GOOD

Fig. 115

## 2. GUIDE ROLLER HEIGHT ADJUSTMENT

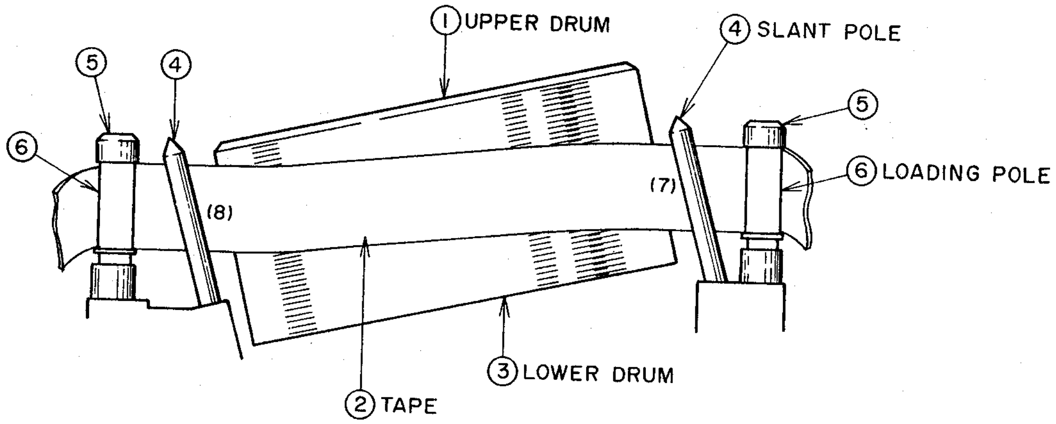

① UPPER DRUM
④ SLANT POLE
⑤
④
⑥
⑤
⑥ LOADING POLE
(7)
(8)
③ LOWER DRUM
② TAPE

Fig. 116

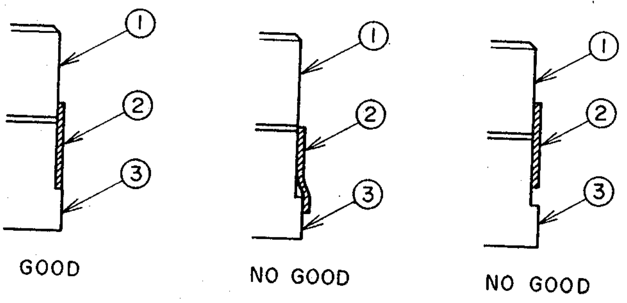

①
②
③
GOOD
①
②
③
NO GOOD
①
②
③
NO GOOD

Fig. 117

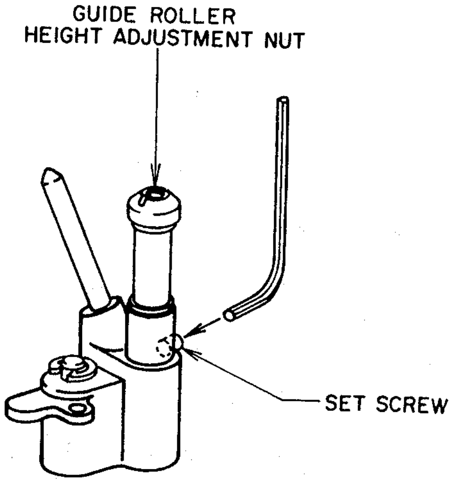

GUIDE ROLLER
HEIGHT ADJUSTMENT NUT
SET SCREW

Fig. 118

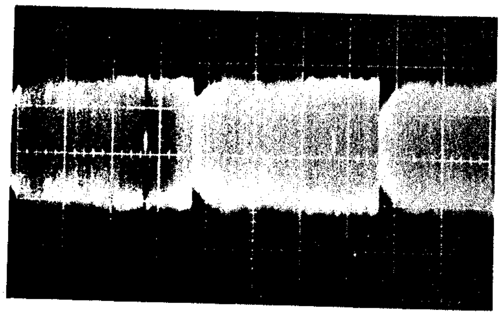


Fig. 119

1) Slightly loosen the set screw at the lower part of the guide roller so that the guide roller can be adjusted with reasonable tightness (See Fig. 118).
2) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
3) Set the reference tape TF-508RF and achieve PLAY mode.
4) Seeing to it that the oscilloscope shows such a waveform as shown in Fig. 119 and also watching the point (7) of Fig. 116, adjust the height of the guide roller (R) so that the tape runs without curling as shown in Fig. 117 (a).
5) Similarly, adjust the height of the guide roller (L) watching the waveform on the oscilloscope and the point (8) of Fig. 116.
6) Make sure that there is no shaking in the picture of the monitor TV.
7) Fix the guide roller with the set screw.

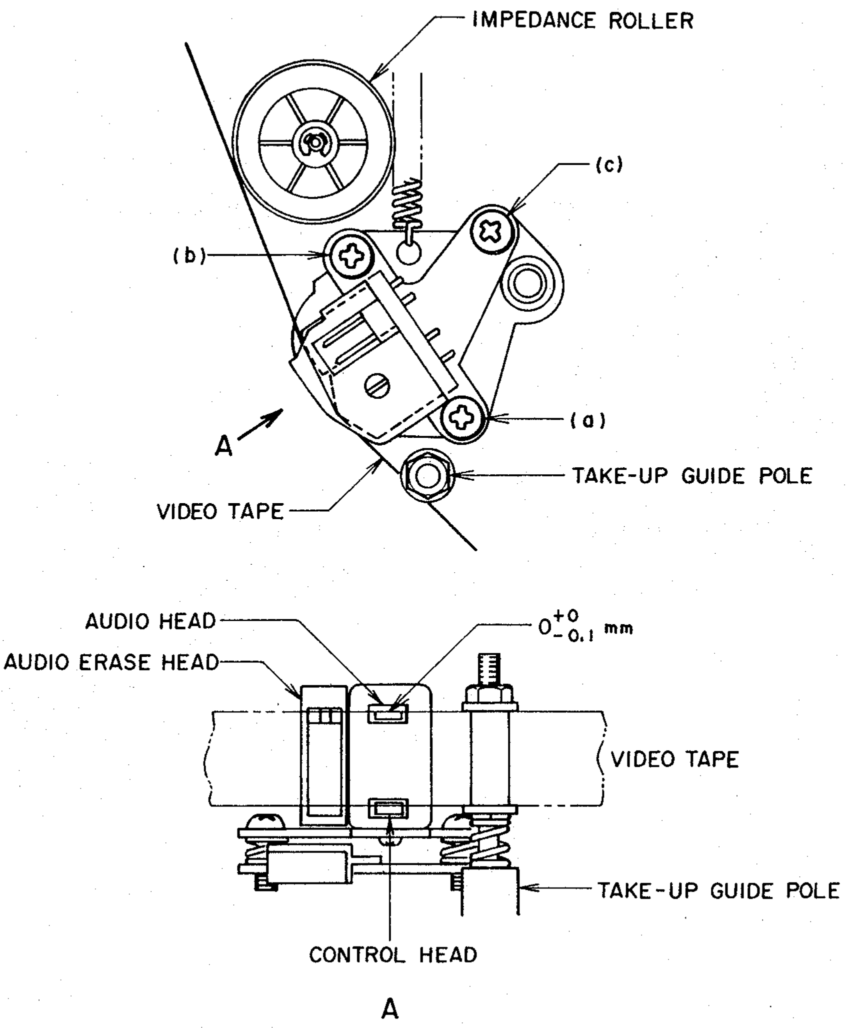

IMPEDANCE ROLLER
(c)
(b)
(a)
A
TAKE-UP GUIDE POLE
VIDEO TAPE
AUDIO HEAD
AUDIO ERASE HEAD
$0^{+0}_{-0.1}$ mm
VIDEO TAPE
TAKE-UP GUIDE POLE
CONTROL HEAD
A

Fig. 120

## 3. AUDIO/CONTROL HEAD HEIGHT, TILT AND AZIMUTH ADJUSTMENT

1) Connect an AC Volt Meter to Audio Out.
2) Playback the reference tape TF-508RF.
3) Turn screws (a), (b) and (c) in order slightly but by exactly the same amount. Adjust the audio output level to its maximum. Take screw (a) as your standard and use screw (b) for azimuth adjustment. Adjust screw (c) until there is no tape wrinkle in the guide pole section, the audio output level is at maximum and there is the minimum possible level fluctuation.

   Then raise and lower screw (a) very slightly and adjust (b) and (c), and set to the point for maximum output.

**NOTE:** Repeat the adjustment of tape guide height, guide roller height and audio/CTL several times in order to achieve the perfect tape running.

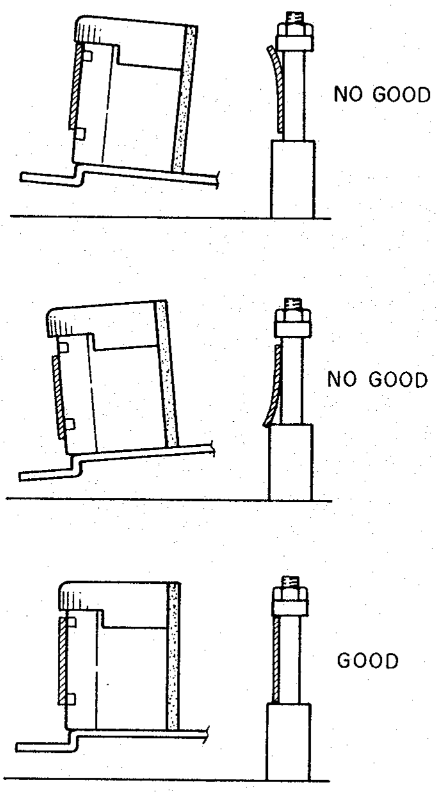

NO GOOD
NO GOOD
GOOD

Fig. 121

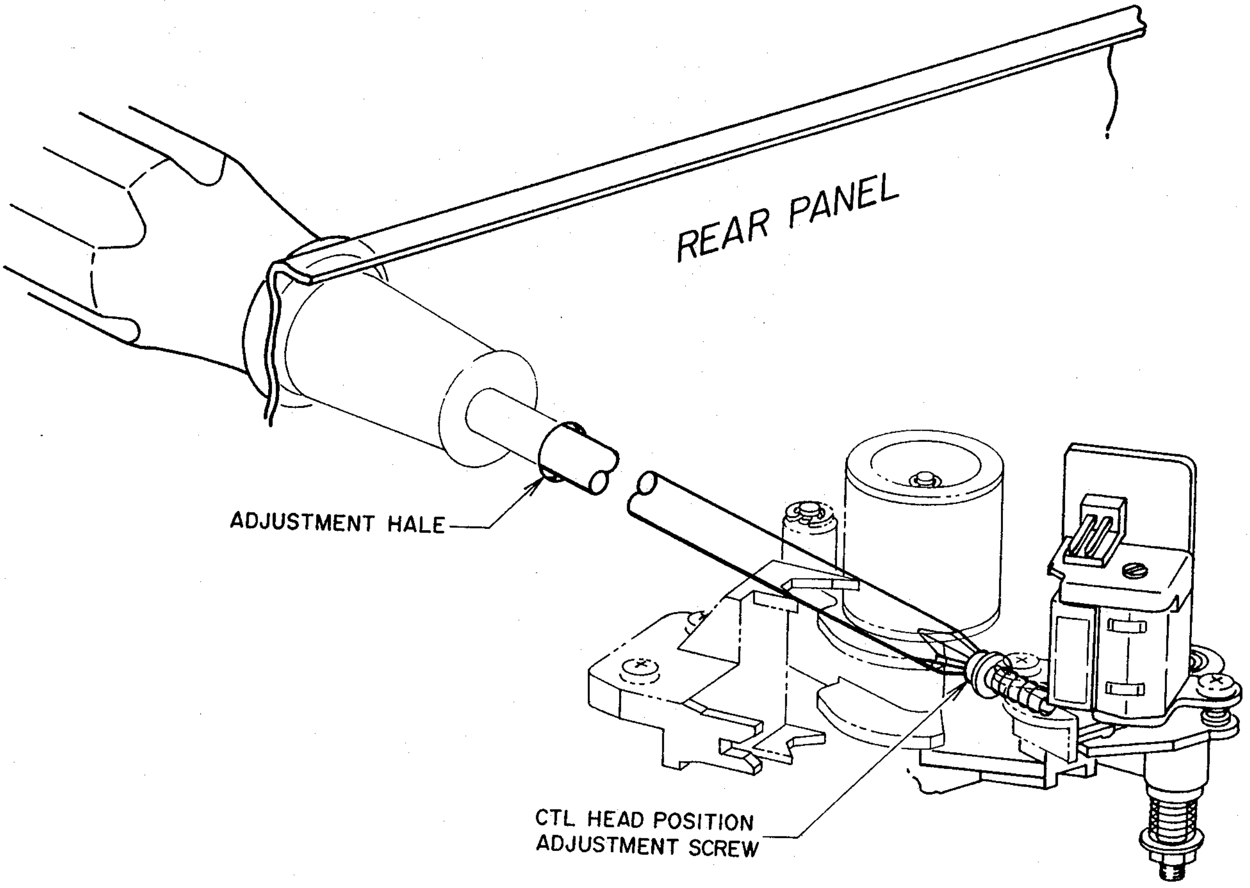


Fig. 122

## 4. CONTROL HEAD POSITION ADJUSTMENT

1) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
2) Set the reference tape TF-508RF and achieve the PLAY mode.
3) Insert a driver into the CTL head position adjustment screw through the adjustment hole in the center of the rear panel.
4) While watching the waveform of the oscilloscope, turn tracking volume on the front panel and confirm in which direction from the click position the maximum point of the waveform is located.
5) Turn back the tracking volume to the click position and carry out the following a) or b) adjustment.
    a) If the maximum point of the waveform is reached by turning the tracking volume clockwise, turn the adjusting driver counterclockwise and make adjustment to the maximum point.
    b) If the maximum point of the waveform is reached by turning the tracking volume counterclockwise, turn the adjusting driver clockwise to make adjustment to the maximum point.

**NOTE:** Make these adjustments only after the tape running is completely adjusted.

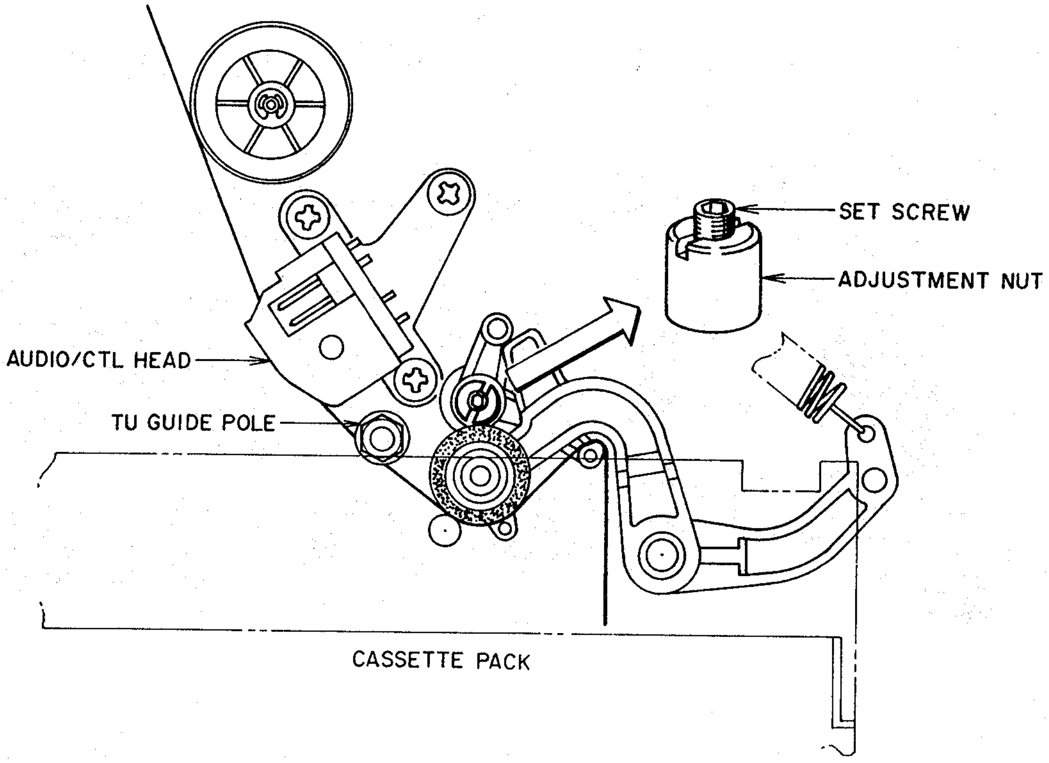

SET SCREW
ADJUSTMENT NUT
AUDIO/CTL HEAD
TU GUIDE POLE
CASSETTE PACK

Fig. 123

## 5. ADJUSTMENT OF QUICK FINDER (REVIEW) RUN

1) Set the recording and playback tape E-240 and wind it up.
2) Press the PLAY button and REVIEW button to achieve the REVIEW mode.
3) Loosen the set screw in Fig. 123 so that the adjustment nut can be turned.
4) While watching the tape running on the take-up guide pole, turn the adjustment screw slowly so as to eliminate the curling of the tape (Fig. 124 (C)).
5) Tighten the set screw and fix the adjustment screw.

NOTE: If the adjustment nut is turned too fast, some deviation may be found after adjustment because the tape running does not follow such a fast pace.

6) After the completion of adjustment, press the stop button once, and after unloading the tape, recheck the review run.

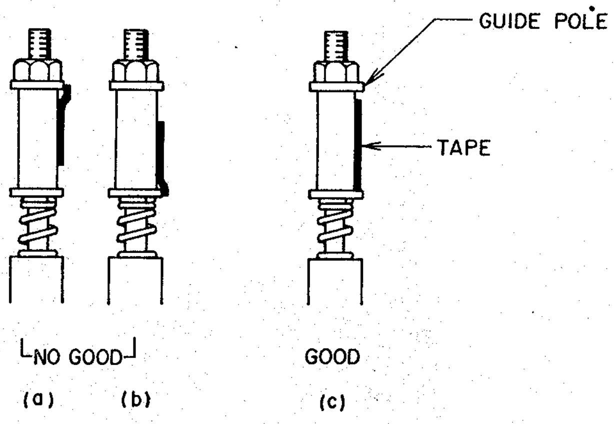

GUIDE POLE
TAPE
NO GOOD
GOOD
(a)
(b)
(c)

Fig. 124

# X. ELECTRICAL ADJUSTMENT

## 1. POWER SUPPLY P.C BOARD ADJUSTMENT

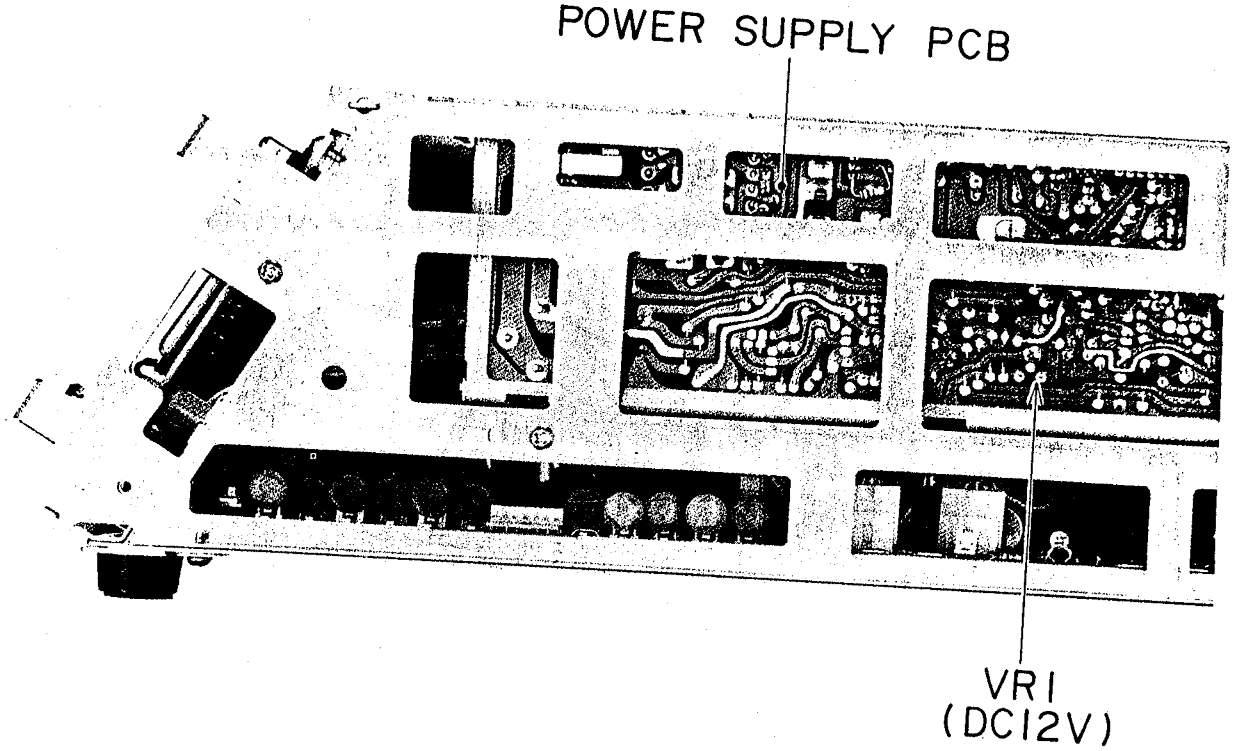

POWER SUPPLY PCB
VR1
(DC12V)

Fig. 125 DC 12V Adjustment Point (Right Side View)

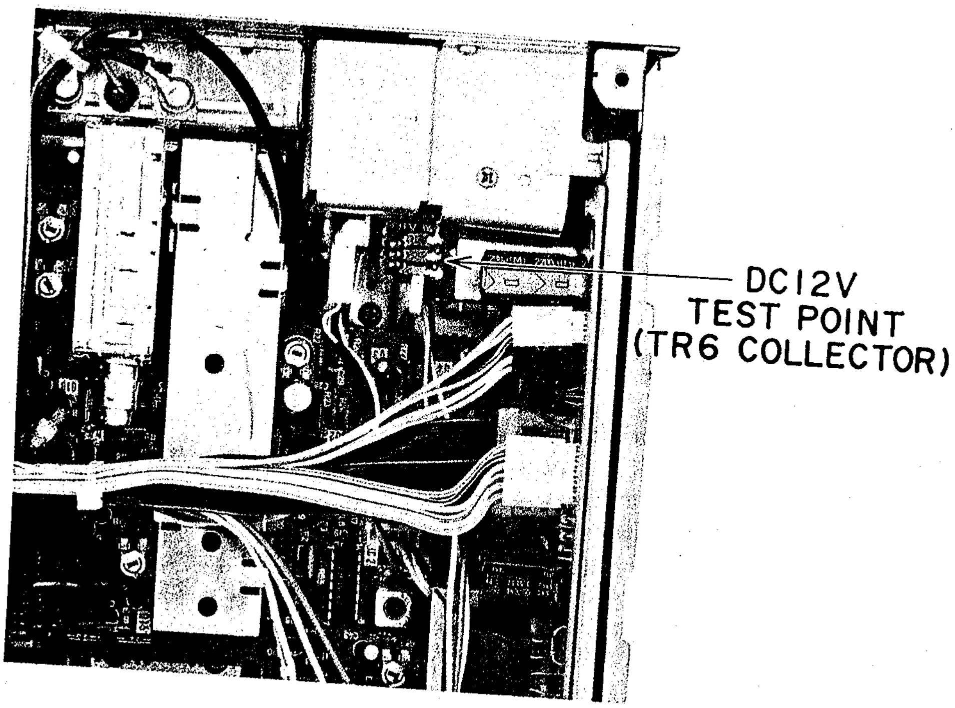

DC12V
TEST POINT
(TR6 COLLECTOR)

Fig. 126 DC 12V Test Point

1) Connect the DC voltmeter to the test point (TR6 collector).
2) Turn ON the function switch to achieve the STOP mode.
3) Adjust the VR1 on the Power Supply P.C Board so that the voltage at the test point will be 12V ± 0.05V.

## 2. SERVO P.C BOARD ADJUSTMENT

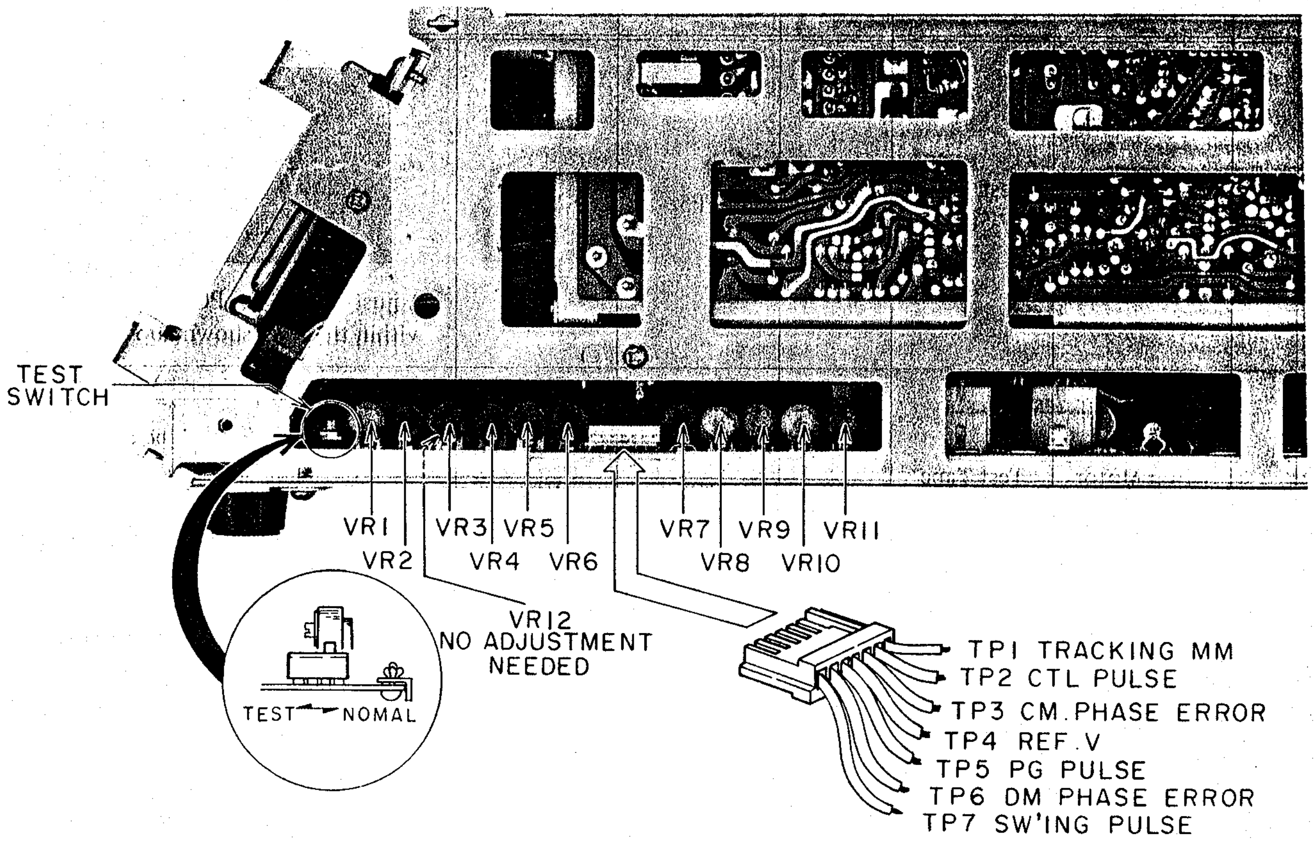

TEST SWITCH
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VR8
VR9
VR10
VR11
VR12
NO ADJUSTMENT
NEEDED
TEST
NOMAL
TP1 TRACKING MM
TP2 CTL PULSE
TP3 CM.PHASE ERROR
TP4 REF.V
TP5 PG PULSE
TP6 DM PHASE ERROR
TP7 SW'ING PULSE

Fig. 127 Servo P.C Board V1004A5340 (Right Side View)

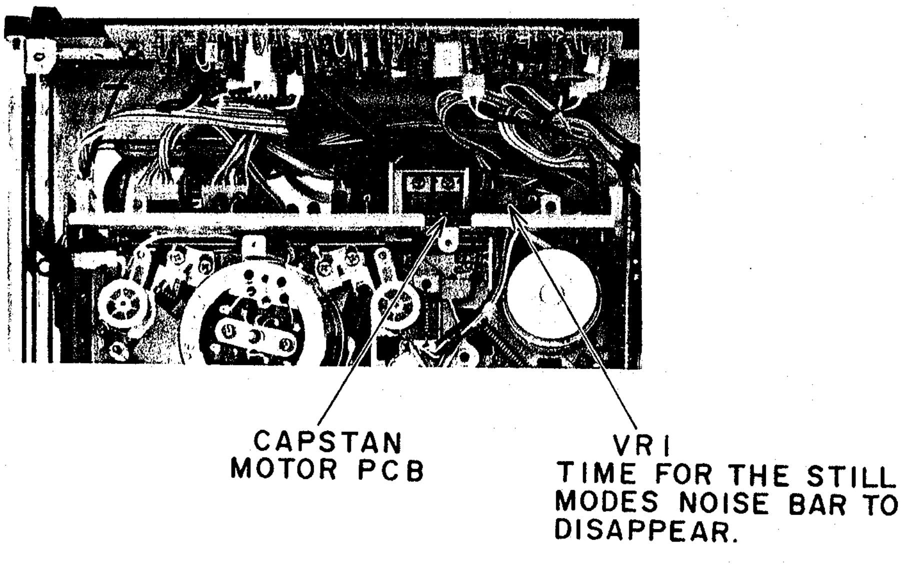
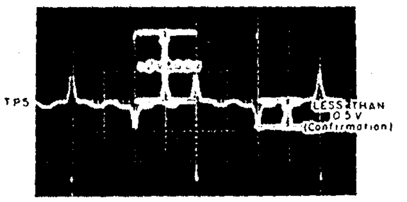
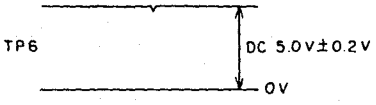
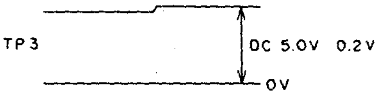
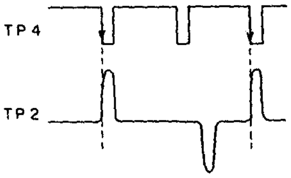
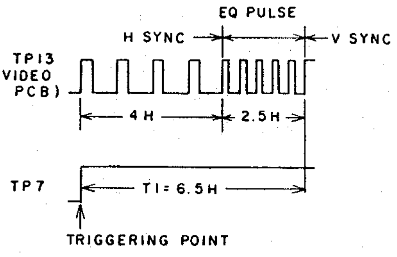
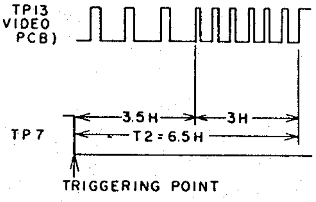
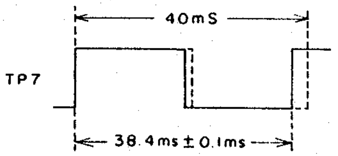
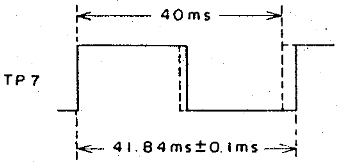
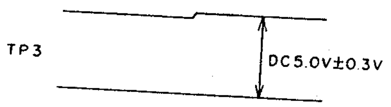
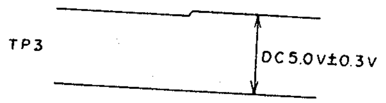
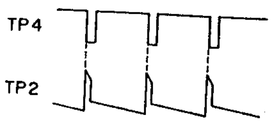

CAPSTAN
MOTOR PCB
VR1
TIME FOR THE STILL
MODES NOISE BAR TO
DISAPPEAR.

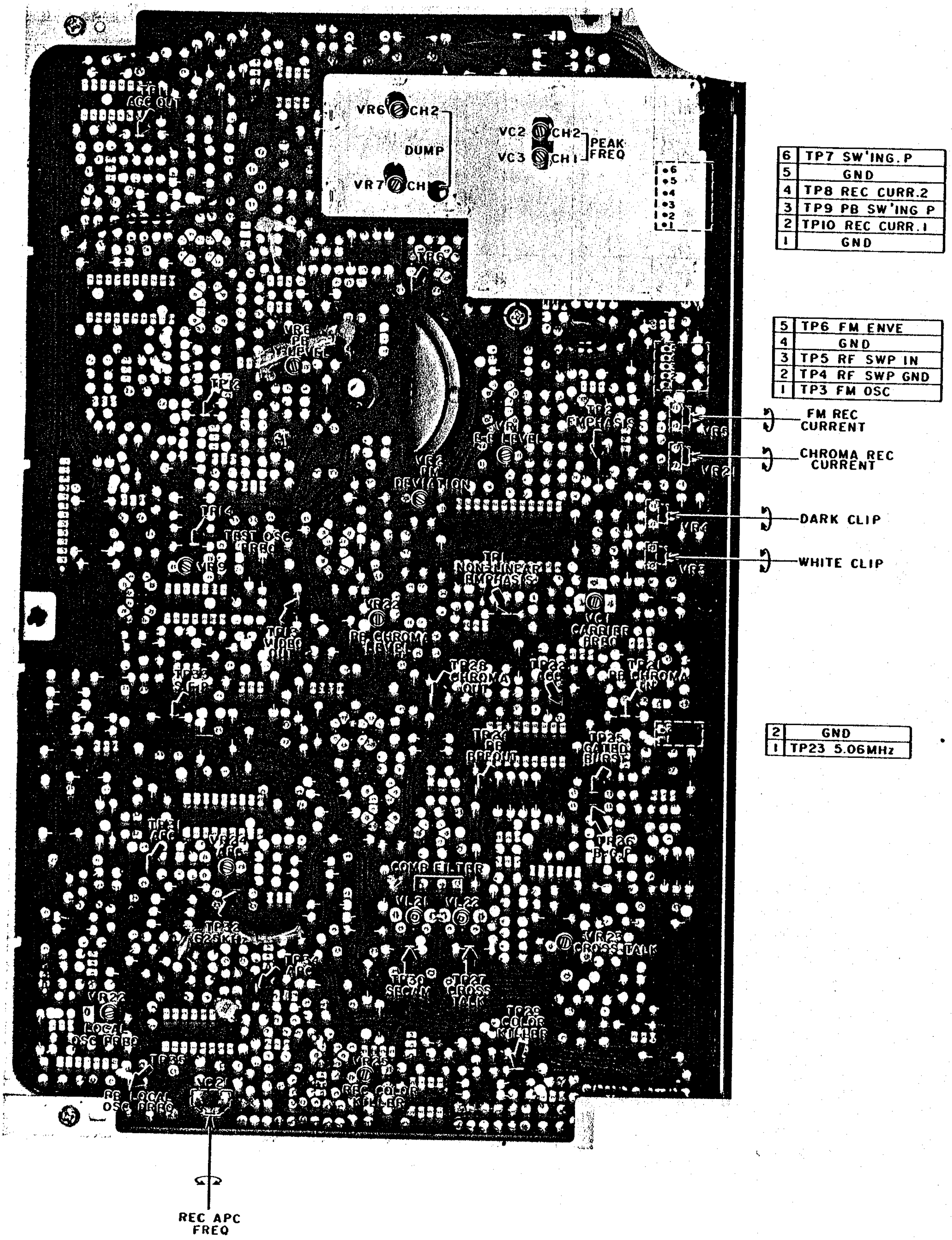
Fig. 128 Capstan Motor P.C Board V1004B5491

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 1 | PG Pulse | Test Tape (TF-508RF) | PB | TP5 | VR1 |  <br>Adjust so that the PG waveform is within the level shown above. |
| 2 | Drum Motor Normal Speed | Test Tape (TF-508RF) | PB | TP6 | VR6 |  <br>Adjust so that the drum servo phase error voltage is within DC 5.0V ± 0.2V. |
| 3 | Capstan Motor Normal Speed | Test Tape (TF-508RF) | PB | TP3 | VR8 |  <br>Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.2V. |
| 4 | Tracking Preset (EXT-Tracking volume is set to OFF Position.) | Test Tape (TF-508RF) | PB | TP4 (REF-V)<br>TP2 (CTL Pulse) | VR11 |  <br>Adjust so that the start-down waveform portion of REF-V (Servo standard signal) is brought in line with the phase of CTL pulse start-up waveform portion. |

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 5 | PB Switching Point | Test Tape (TF-508RF) | PB | TP13 (Video PCB) TP7 | VR2 (CH1)<br>VR3 (CH2) |  EQ PULSE<br>H SYNC<br>V SYNC<br>TP13 (VIDEO PCB)<br>4 H<br>2.5H<br>TP7<br>T1 = 6.5H<br>TRIGGERING POINT<br> TP13 (VIDEO PCB)<br>3.5H<br>3H<br>TP7<br>T2 = 6.5H<br>TRIGGERING POINT<br>Adjust T1 with VR2 to 6.5H and T2 to 6.5H with VR3.<br>The difference between T1 and T2 should be within 1H. |
| 6 | REC Switching Point | Color Bar from Color Bar Generator | REC | TP13 (Video PCB) TP7 | VR4 | Adjust T1 and T2 waveforms in step 5 to 6.5H ± 1H. |
| 7 | Drum Cue Speed | Test Tape (TF-508RF) | PB Cue (Quick Finder) | TP7 | VR5 |  40mS<br>TP7<br>38.4ms ± 0.1ms<br>Adjust so that the switching pulse width is within 38.4 ms ± 0.1 ms (4.0% increase in speed) |
| 8 | Drum Motor Review Speed | Test Tape (TF-508RF) | PB Review (Quick Finder) | TP7 | VR7 |  40ms<br>TP7<br>41.84ms±0.1ms<br>Adjust so that the switching pulse width is within 41.84 ms ± 1 ms (4.6% increase in speed). |

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 9 | Capstan Motor Cue Speed | Test Tape (TF-508RF) | PB Cue (Quick Finder) | TP3 | VR10 |  <br>Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.3V. |
| 10 | Capstan Motor Cue Speed | Test Tape (TF-508RF) | PB Review (Quick Finder) | TP3 | VR9 |  <br>Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.3V. |
| 11 | Time for the still mode's noise bar to disappear. | Test Tape (TF-508RF) | PAUSE/ STILL | Monitor Screen | VR1 (Capstan Motor PCB) | Adjust the VR1 so that the noise bar disappears smoothly. |
| 12 | TEST SW (Tape Speed Check SW) Confirm Operation | Test Tape (TF-508RF) | PB | TP4 (REF-V) TP2 (FG Count Down) | |  <br>When TEST SW is switched to TEST, waves as shown above will appear on TP2. |

## 3. VIDEO P.C BOARD ADJUSTMENT

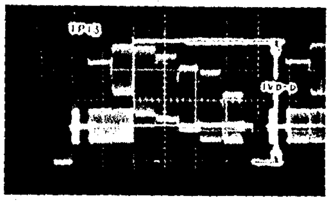
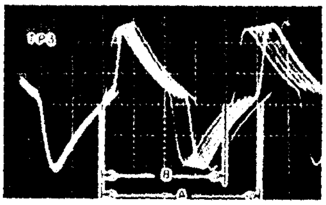
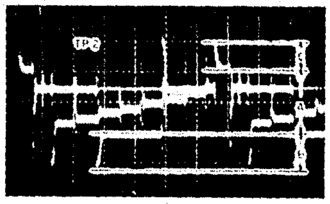
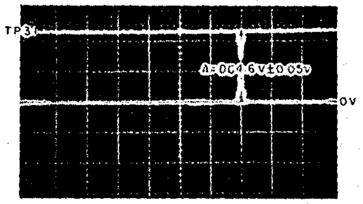

TP1 AGC OUT
VR6 CH2
DUMP
VR7 CH1
VC2 CH2
VC3 CH1
PEAK FREQ
VR8 PB Y LEVEL
TP2
VR1 E-E LEVEL
TP2 EMPHASIS
VR2 FM DEVIATION
TP14 TEST OSC FREQ
VR9
TP1 NON-LINEAR EMPHASIS
VR22 PB CHROMA LEVEL
VC1 CARRIER FREQ
TP13 VIDEO OUT
TP28 CHROMA OUT
TP22 ACC
TP21 PB CHROMA IN
TP33 SCP
TP24 PB BPFOUT
TP25 GATED BURST
TP31 AFC
ACC
TP26 BFG
COMB FILTER
VL21
VL22
VR23 CROSS TALK
TP32 626KHz
TP34 APC
TP30 SECAM
TP27 CROSS TALK
TP29 COLOR KILLER
LOCAL OSC FREQ
TP35
PB LOCAL OSC FREQ
VC21
VR25 REC COLOR KILLER
VR6
FM REC CURRENT
VR21
CHROMA REC CURRENT
VR4
DARK CLIP
VR5
WHITE CLIP
REC APC FREQ

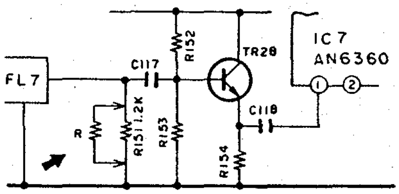
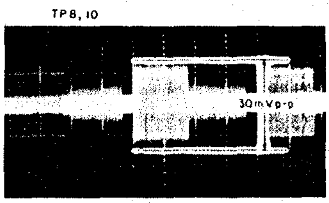
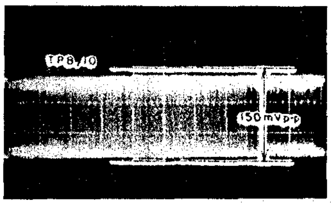
| | |
|---|---|
| 6 | TP7 SW'ING.P |
| 5 | GND |
| 4 | TP8 REC CURR.2 |
| 3 | TP9 PB SW'ING P |
| 2 | TP10 REC CURR.1 |
| 1 | GND |

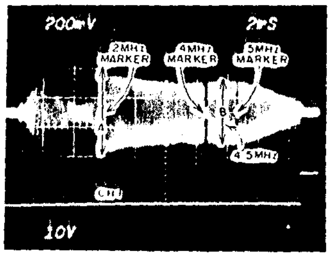
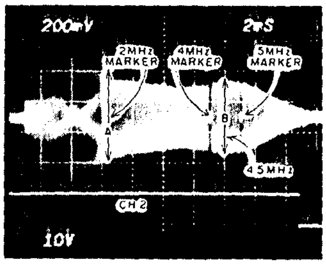
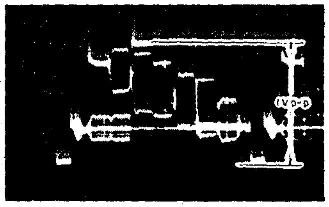
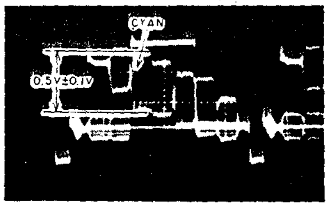
| | |
|---|---|
| 5 | TP6 FM ENVE |
| 4 | GND |
| 3 | TP5 RF SWP IN |
| 2 | TP4 RF SWP GND |
| 1 | TP3 FM OSC |

| | |
|---|---|
| 2 | GND |
| 1 | TP23 5.06MHz |

Fig. 129

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 1 | E-E Level | Color Bar from Color Bar Generator | E-E | TP13 | VR1 |  <br>Adjust so that the video output is 1 Vp-p. |
| 2 | Carrier and Deviation | Color Bar from Color Bar Generator | REC | TP3 | VC1<br>(Carrier set)<br>VR2<br>(Deviation) |  <br>Carrier set A = 0.263 µs<br>Deviation B = 0.208 µs |
| 3 | White Clip and Dark Clip | Color Bar from Color Bar Generator | REC | TP2 | VR3<br>(White Clip)<br>VR4<br>(Dark Clip) |  <br>White Clip A:B = 1:0.65<br>Dark Clip A:C = 1:0.45 |
| 4 | Test OSC | No Signal | STOP | TP14 | VR9 | Set the CH SET switch to "ON" (Rear Panel) and connect the frequency counter to TP14. At this time, adjust so that the frequency is within 15.625 kHz ± 100 Hz. |
| 5 | AFC | Color Bar from Color Bar Generator | E-E | TP31 | VR24 |  <br>Adjust so that "A" is within DC 4.6V ± 0.05V. |
| 6 | APC | Color Bar from Color Bar Generator | E-E | TP23 | VC21 | 5.060571 ± 10 Hz |

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 7 | Rec Color Killer | Color Bar from Color Bar Generator | E-E | Monitor screen | VR25 |  FL7<br>C117<br>R152<br>TR28<br>IC7<br>AN6360<br>①<br>②<br>C118<br>R<br>R151 1.2K<br>R153<br>R154<br>R=120ohms : MONO CHROME<br>R=150ohms : COLOR<br>Set the mode switch of rear panel to "AUTO". Connect 120 ohms resistance and subsequently 150 ohms resistance to the R151 (1.2 ohms) of Video PCB.<br>At this time, adjust so that a monochrome picture appears at 120 ohms and a color picture appears at 150 ohms. |
| 8 | Rec Current | Color Bar from Color Bar Generator | REC | TP8<br>TP10 | VR21<br>(CHROMA)<br>VR5<br>(Y) |  <br>(a) CHROMA REC CURRENT<br> <br>(b) Y REC CURRENT<br>1) Fully turn the VR5 clockwise.<br>2) Adjust the Chroma Rec current so that TP8 and TP10 waveforms are set to 30 mVp-p by the VR21.<br>3) Adjust the Y Rec current so that the TP8 and TP10 waveforms are set to 150 mVp-p by the VR5. |

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 9 | Video Head Resonance and Q (quality factor) | Test Tape (TF-515SW) | PB | TP6 | VC2<br>VR7<br>(CH1)<br>VC3<br>VR6<br>(CH2) |  <br> <br>1) Apply DC +12V to the TP7.<br>2) Fully turn the VR7 clockwise and then adjust the VC2 so that the peak frequency is 4.8 MHz.<br>3) Adjust the VR7 so that "Q" is set at a ratio of A : B = 1 : 0.8.<br>4) Connect the TP7 to the GND level and adjust the CH2 (VC3, VR6) in the same way as in the CH1. |
| 10 | PB Y Level | Test Tape (TF-510CB) | PB | TP13 | VR8 |  <br>Adjust so that the video output is 1 Vp-p. |
| 11 | Local OSC | Test Tape (TF-510CB) | PB | TP35 | VC22 | 4.433619 MHz ± 15 Hz |
| 12 | PB Chroma Level | Test Tape (TF-510CB) | PB | TP13 | VR22 |  <br>As shown in the figure above, adjust so that a cyan level is within 0.5V ± 0.1 Vp-p. |

## 4. AUDIO P.C BOARD ADJUSTMENT

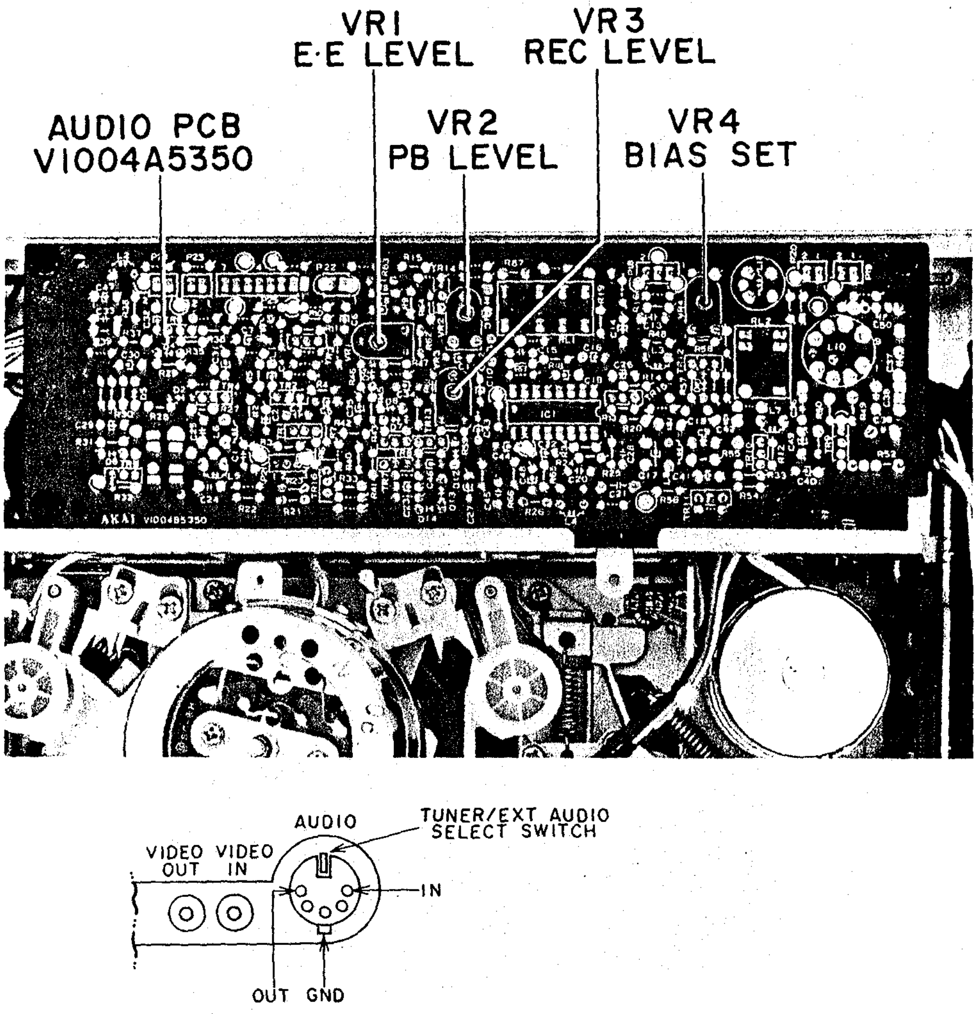

VR1
E·E LEVEL
VR3
REC LEVEL
AUDIO PCB
V1004A5350
VR2
PB LEVEL
VR4
BIAS SET
AUDIO
TUNER/EXT AUDIO
SELECT SWITCH
VIDEO OUT
VIDEO IN
IN
OUT
GND

Fig. 130

| Step | Adjustment Item | Input | Mode | Test Point | Adjustment Parts | Result & Remarks |
|---|---|---|---|---|---|---|
| 1 | E-E Level | Audio Input<br>1 kHz, −20 dB | E-E | Audio Out | VR1 | −6 dBm ± 0.5 dBm |
| 2 | PB Level | Test Tape<br>TF-513LS<br>(1,000 Hz) | PB | Audio Out | VR2 | −6 dBm ± 0.5 dBm |
| 3 | Rec Level | Audio Input<br>1 kHz, −20 dB | REC/PB | Audio Out | VR3 | −6 dBm ± 0.5 dBm |
| 4 | Frequency Response | Audio Input<br>100 Hz, −20 dB<br>1 kHz, −20 dB<br>7 kHz, −20 dB | REC/PB | Audio Out | VR4 | 100 Hz : −6 dBm ± 1 dBm<br>1 kHz : −6 dBm ± 0.5 dBm<br>7 kHz : −6 dBm $^{+2}_{-3}$ dBm |
| 5 | Distortion Factor | Audio Input<br>1 kHz, −20 dB | REC/PB | Audio Out | Confirm | Less than 3% |
| 6 | Adjust by repeating steps 3, 4 and 5. | | | | | |

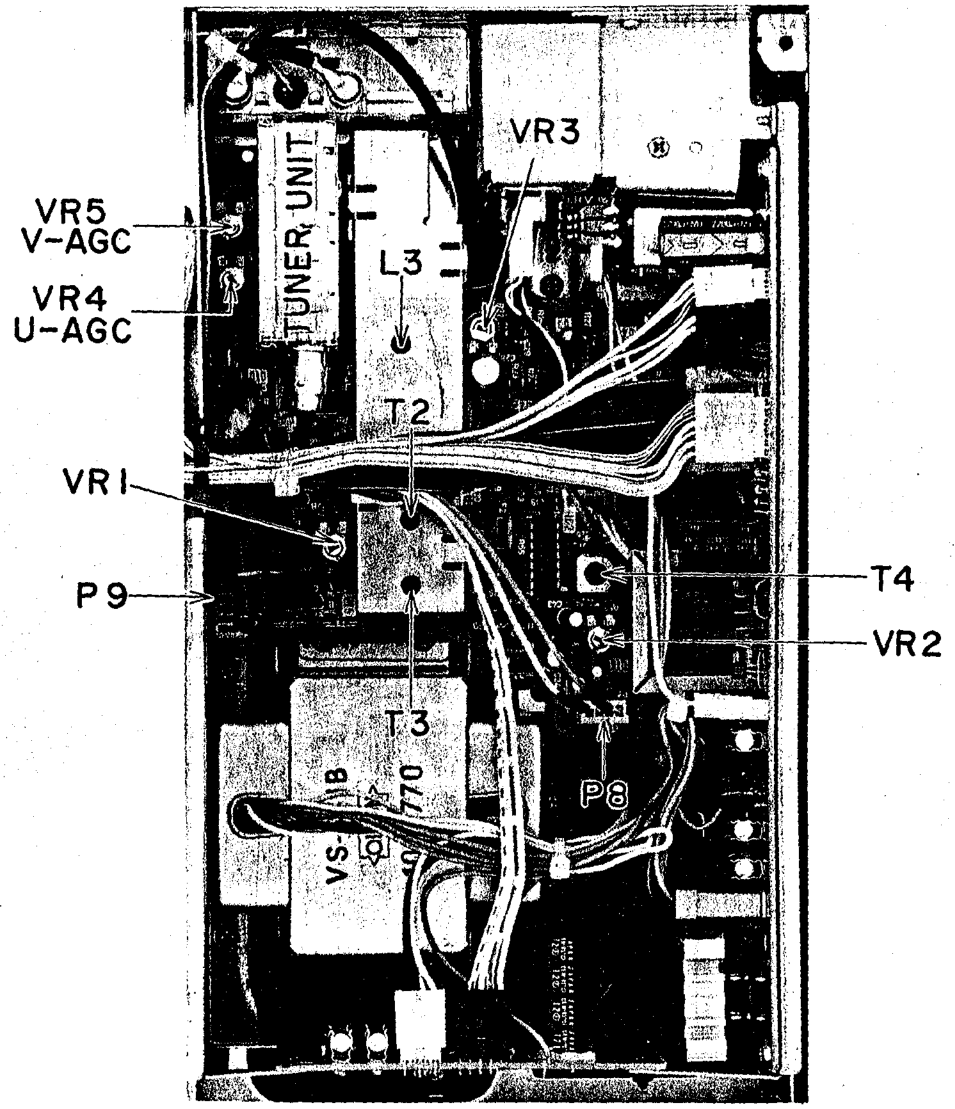

VR3
VR5
V-AGC
VR4
U-AGC
TUNER UNIT
L3
T2
VR1
P9
T4
VR2
T3
P8

Fig. 131

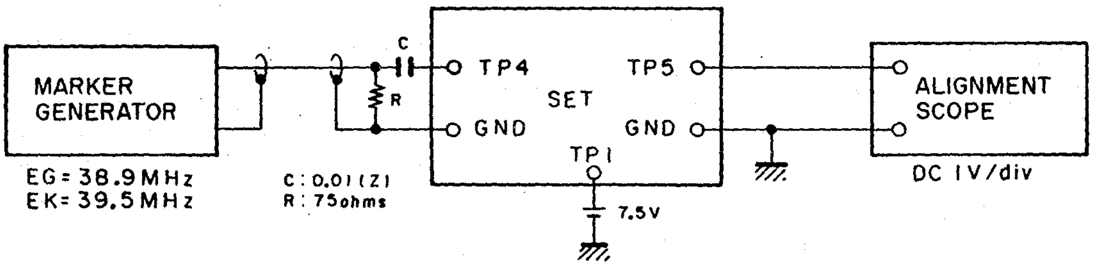

MARKER
GENERATOR
EG=38.9MHz
EK=39.5MHz
C
R
C: 0.01(Z)
R: 75ohms
TP4
SET
TP5
GND
GND
TP1
7.5V
ALIGNMENT
SCOPE
DC 1V/div

Fig. 132

## 5. TUNER ADJUSTMENT

Since the adjustment of the Tuner P.C Board requires a special jig, avoid touching the adjustment point. But should any adjustment become necessary, use the following adjustment method.

### 5-1. Tank Coil Adjustment

1) Apply 50 mVp-p in IF frequency (EG = 38.9 MHz, EK = 39.5 MHz) to TP4 (IF terminal) on the Tuner P.C Board.
2) Connect the alignment scope to TP5 (intersection between L4 and R16).
3) Apply DC7.5V to TP1 (IF AGC).
4) Adjust T2 so that the DC voltage appearing on the alignment scope will be minimum.

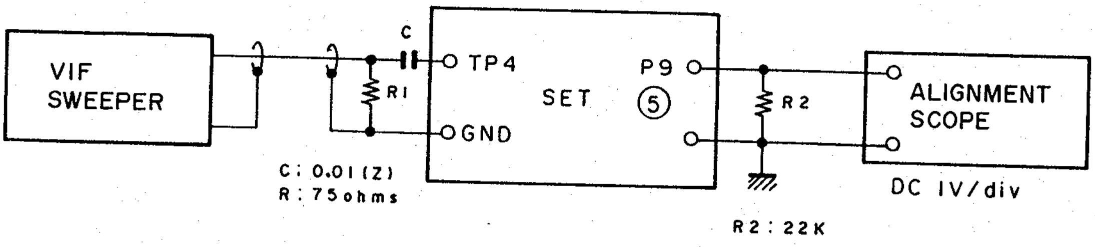

VIF SWEEPER
C
TP4
R1
GND
SET
P9
⑤
R2
ALIGNMENT SCOPE
C: 0.01 (Z)
R: 75ohms
DC 1V/div
R2: 22K

Fig. 133

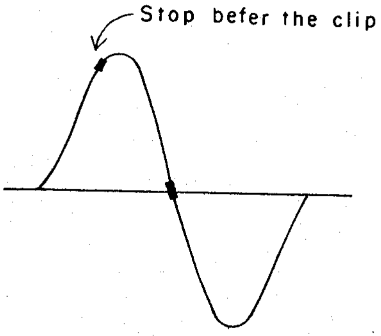

Stop befer the clip

Fig. 134

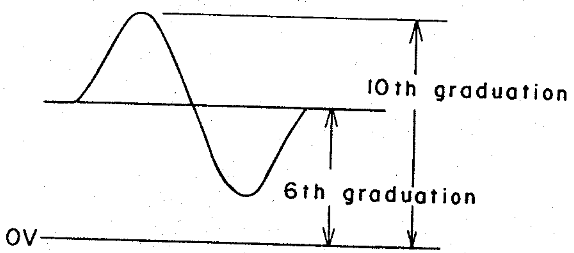

10th graduation
6th graduation
0V

Fig. 135

## 5-2. AFC Adjustment

1) Connect VIF sweeper output 70 dB to the tuner IF (TP4).
2) Connect the alignment scope to the AFC terminal (Pin ⑤ of P9).
3) Make sure that VR1 is in the center, give an optional size to the waveform with the IF AGC volume, and make approximate adjustment with T3 so that the marker will be positioned at 6th graduation of the alignment scope.
4) Stop with IF AGC volume before the waveform is clipped (Fig. 134).
5) Stop with VR1 before the waveform is clipped.
6) Adjust with T3 so that the marker (EG = 38.9 MHz, EK = 39.5 MHz) will be at 6th graduation of the alignment scope. (Fig. 135).

## 5-3. VIF Adjustment

1) Apply VIF sweeper output 70 dB to TP4 (IF).
2) Connect the emitter of TR2 to the alignment scope.
3) Connect dummy resistors of 100 ohms to both ends of the tank coil (TP2, TP3).
4) Set the alignment scope to 10th graduation by means of the IF AGC volume and adjust the marker position as shown in Fig. 137 (a) and (b).

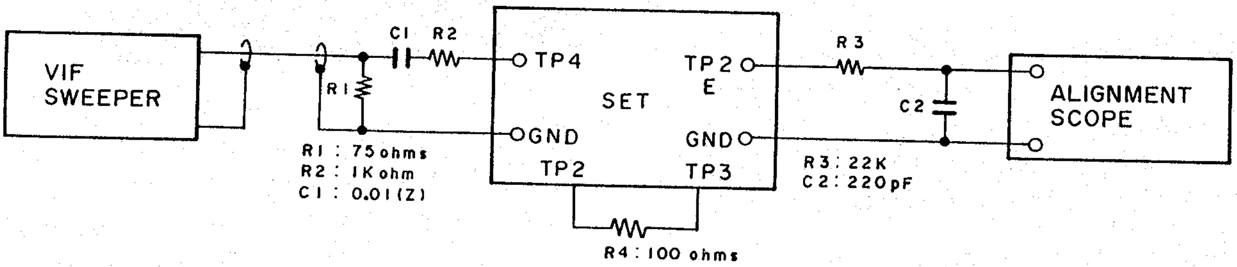
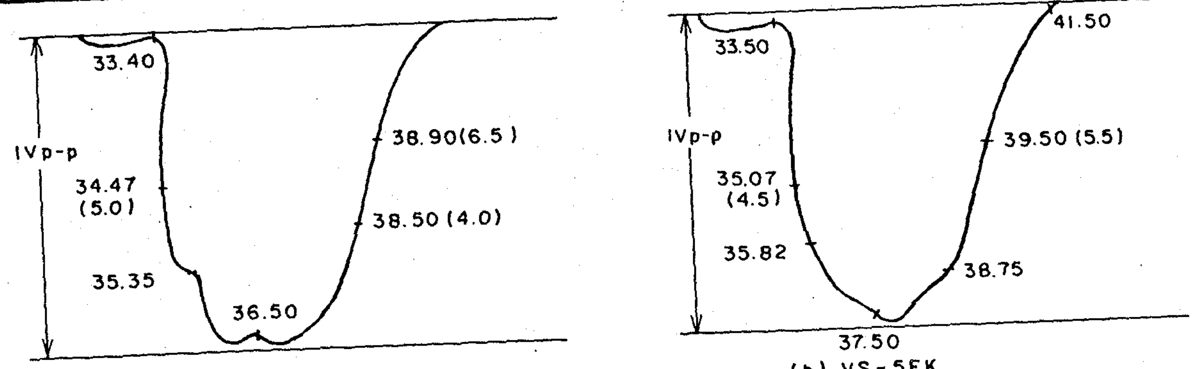

VIF SWEEPER
C1
R2
R1
TP4
GND
SET
TP2
E
GND
TP2
TP3
R3
C2
ALIGNMENT SCOPE
R1 : 75ohms
R2 : 1K ohm
C1 : 0.01 (Z)
R3: 22K
C2: 220pF
R4 : 100 ohms

Fig. 136



(a) VS-5EG

(b) VS-5EK

Fig. 137

### 5-4. SIF Adjustment

1) Apply DC 6.0V to Pin ⑥ of P9.
2) Connect an AC voltmeter and a distortion meter to Pin ③ of P8.
3) Connect an oscilloscope to Pin ① of P8.
4) Add the following RF signals to ANT IN.

| | | |
|---|---|---|
| EG model | VHF 12CH (color bar) | 58 dB |
| | UHF 50CH (Philips) | |
| EK model | UHF 30CH (color bar) | |

5) Receive 12CH (color bar), turn AFC ON and OFF with the tuning knob to adjust the waveform to the extent that the size will not change, and turn AFC ON. (For EK model, adjust with UHF 30CH).
6) Turn VR2 fully anticlockwise, and adjust with T4 so that the reading of the AC voltmeter will be maximum and that the distortion factor will be minimum.
7) Adjust with VR2 so that the reading of the AC voltmeter will be −17 dB.

### 5-5. Video Out Adjustment

Under the aforementioned condition, adjust with VR3 so that the video signal level of the oscilloscope will be 1 Vp-p.

### 5-6. RF AGC Adjustment

1) Under the aforementioned condition, connect a digital voltmeter to the AGC terminal (TP-5).
2) Receive 12CH (color bar) and adjust with VR5 so that DC 6.5V ± 0.2V is achieved (EG model).
3) Receive 50CH (Philips), and adjust with VR4 so that DC 6.5V ± 0.2V is achieved (EG model).
4) Receive 30CH (color bar) and adjust with VR4 so that DC 6.5V ± 0.2V is achieved (EK model).

## 6. 38 kHz TUNING COIL ADJUSTMENT (REMOTE CONTROL)

1) Connect an oscilloscope to TP.
2) Keep pushing the PAUSE/STILL button on the remote control unit, and observe the waveform at TP.
3) Change the direction of the remote control unit to decrease the input to the detector as much as possible (for example by transmitting toward the wall and receiving the reflected wave).

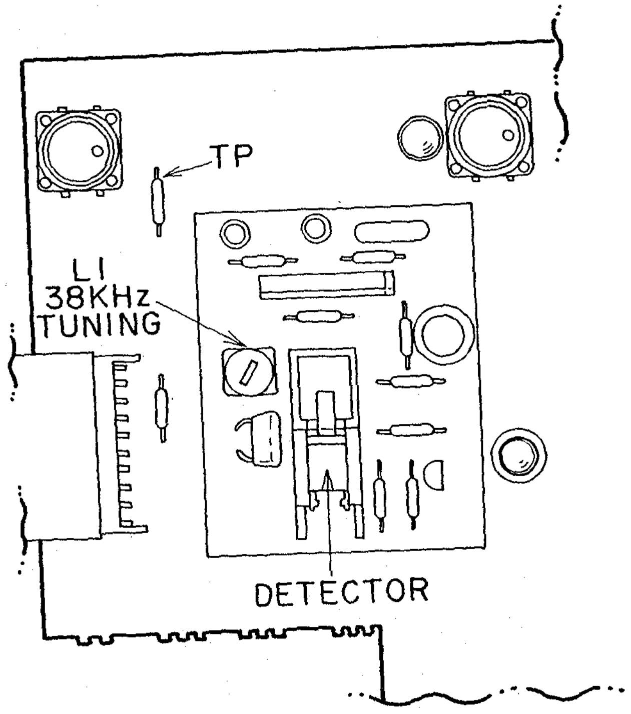


Fig. 138 Display P.C Board

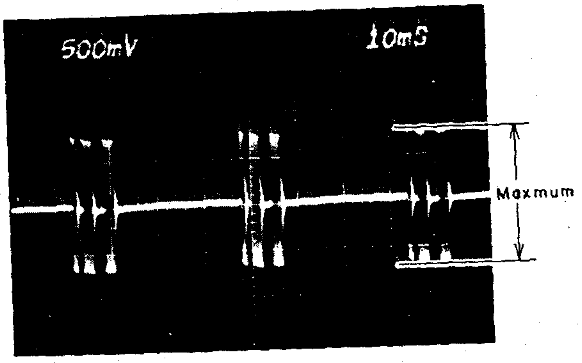


Fig. 139

4) Adjust L1 so that the amplitude of the waveform at TP increases to the maximum.

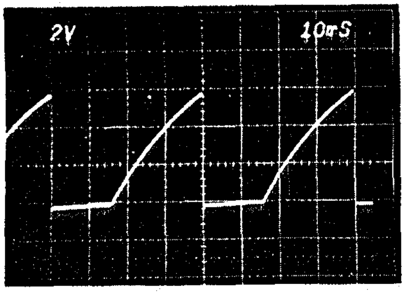
**NOTE:** If the waveform amplitude remains unchanged when L1 is turned, it is because the input level is so high as to cause the receiving circuit's AGC to work.
In this case, adjust after reducing the input to the detector.

# XI. VARIOUS WAVEFORMS AT EACH TEST POINT

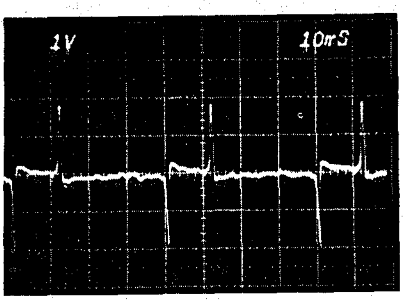
NOTES:
1. All the waveforms are measured using the VS-5EG.
2. Use the Color Bar Tape (TF-510CB) as the playback tape and the Color Bar Signal 1 Vp-p from SSG as the input during recording.
3. If not specially instructed take the waveform when the oscilloscope is in the AC Mode.
4. Showing the Volt/cm for left upper side figure and Time/cm for right upper side figure on the waveform photos.
(For example: making an ofservation at TP1 under 2V/cm, 10mS/cm condition).

## 1. SERVO P.C BOARD

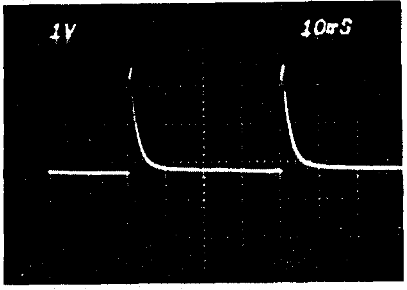
**TP1 (PB, REC)**



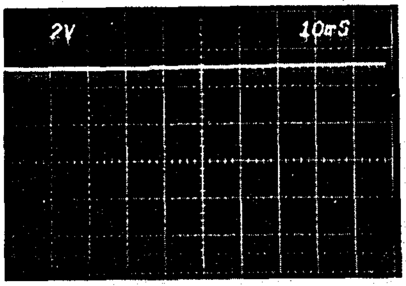
**TP2 (PB)**



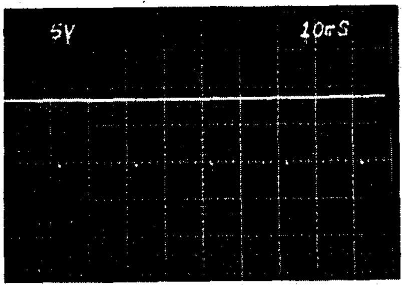
**TP2 (REC)**



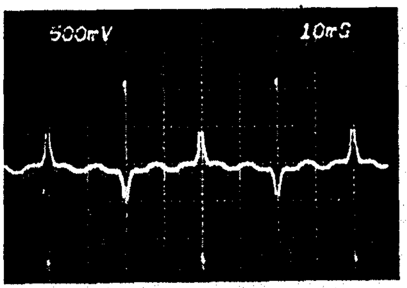
**TP3 DC (PB, REC)**



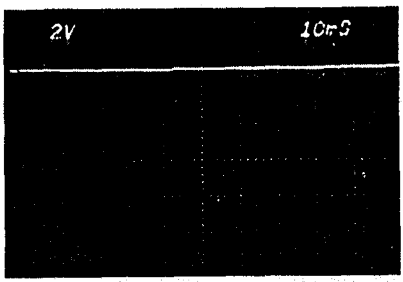
**TP4 (PB, REC)**



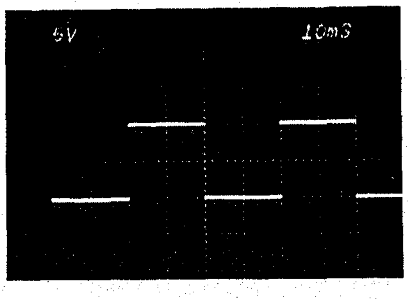
**TP5 (PB, REC)**



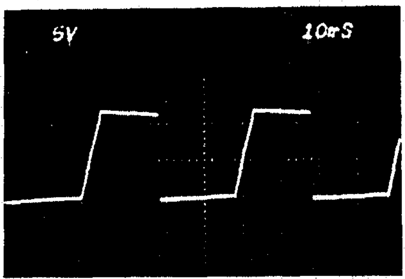
**TP6 DC (PB, REC)**



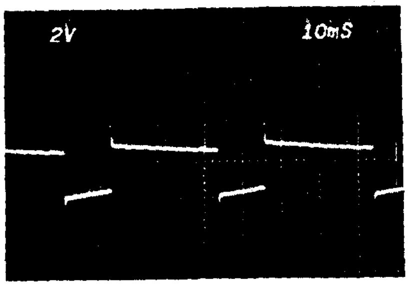
**TP7 (PB, REC)**



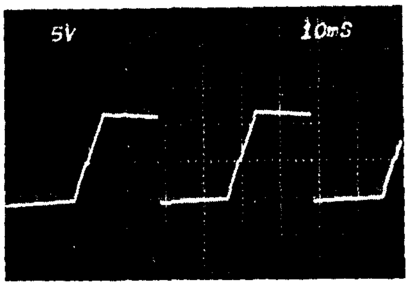
**CC1 (PB, REC)**



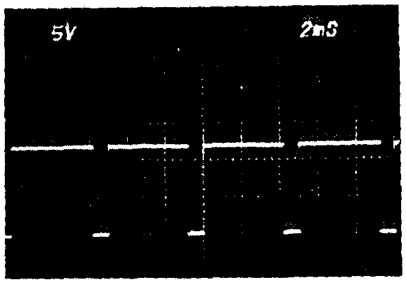
CC2 (REC)



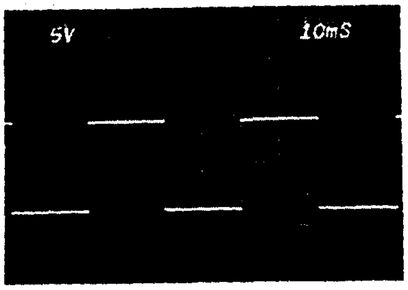
CC3 (PB, REC)



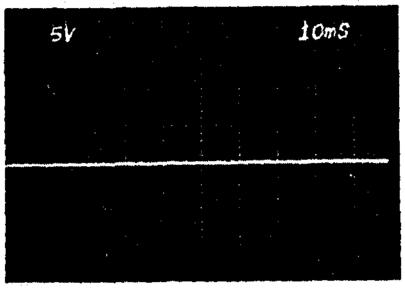
CC4 (PB, REC)



CC5 (PB, REC)

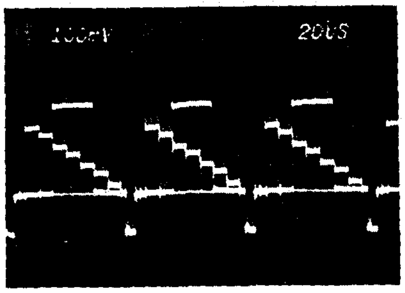


CC6 (PB)

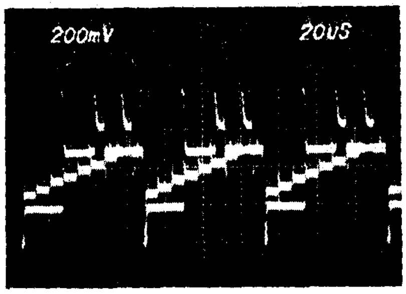


## 2. VIDEO P.C BOARD

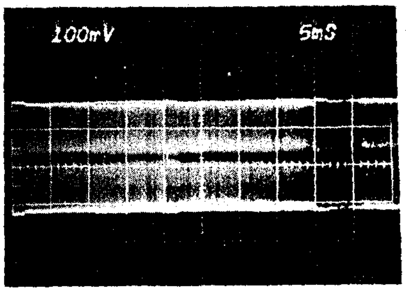
TP1 (EE, PB)



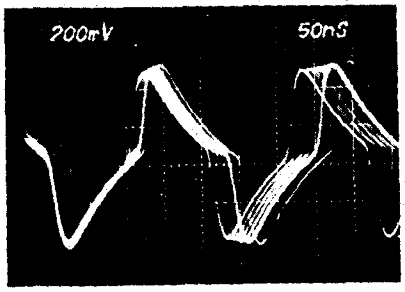
TP2 (EE)



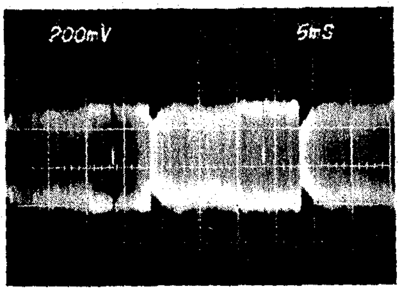
TP3 (REC)



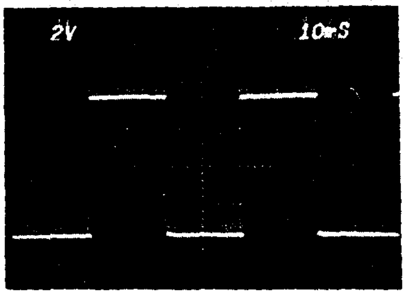
TP3 (REC)



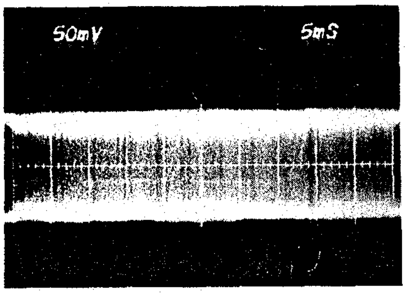
TP6 (PB)



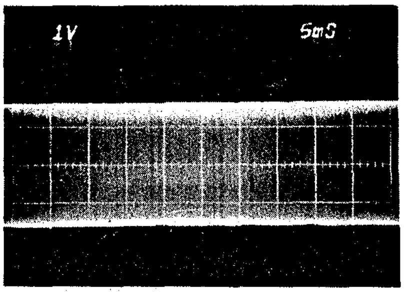
TP7 (PB, REC)



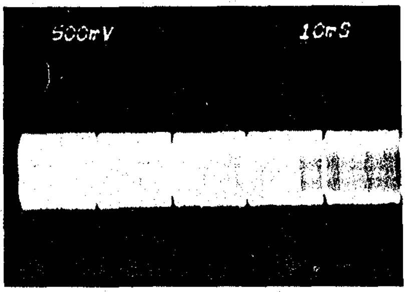
**TP8, TP10 (REC)**



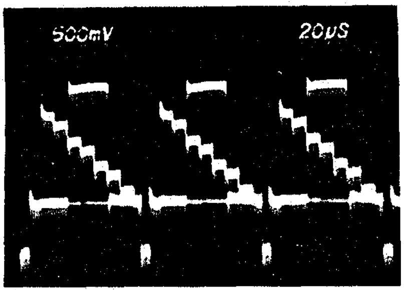
**TP9 (REC)**



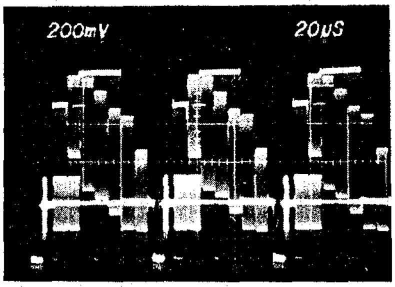
**TP11 (PB)**



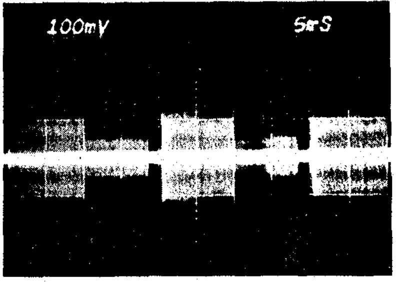
**TP12 (PB)**



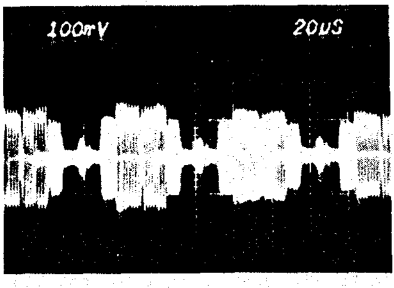
**TP13 (EE, PB)**



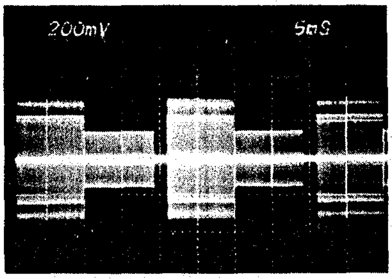
**TP21 (PB)**



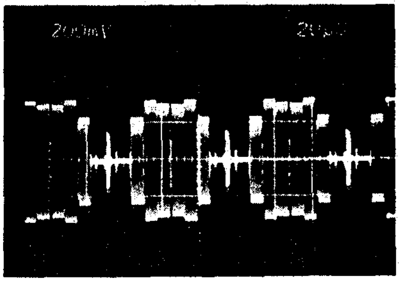
**TP21 (PB)**



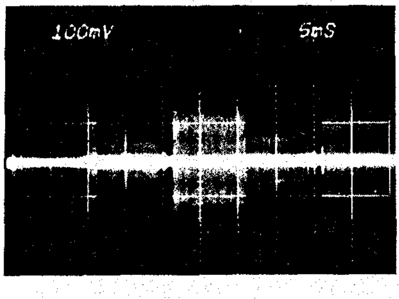
**TP22 (REC)**



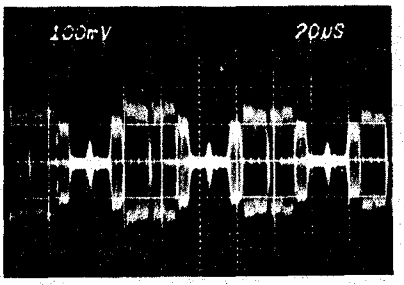
**TP22 (REC)**



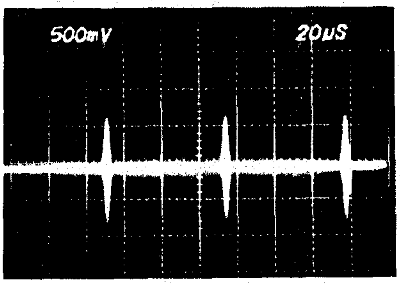
**TP24 (PB)**



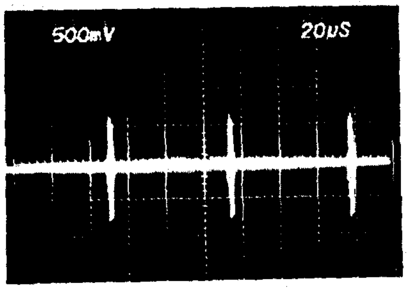
**TP24 (PB)**



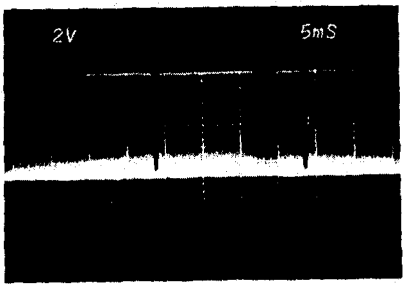
**TP25 (PB)**



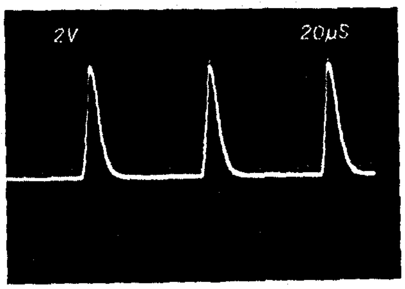
**TP25 (EE)**



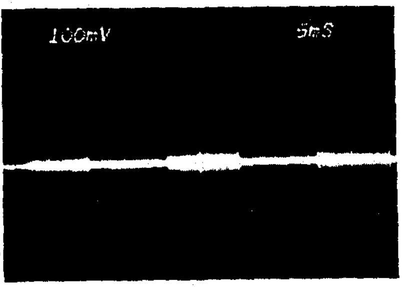
**TP26 (PB, REC)**



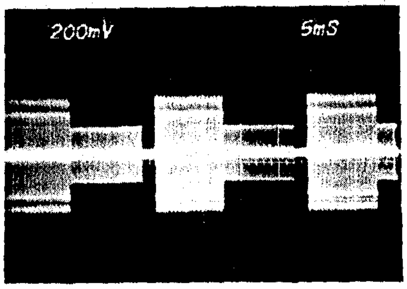
**TP26 (PB, REC)**



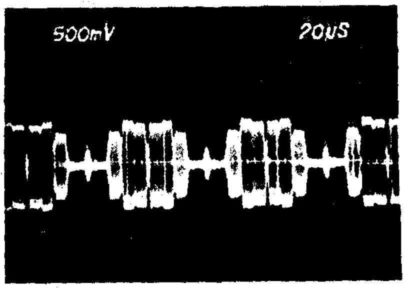
**TP27 (PB)**



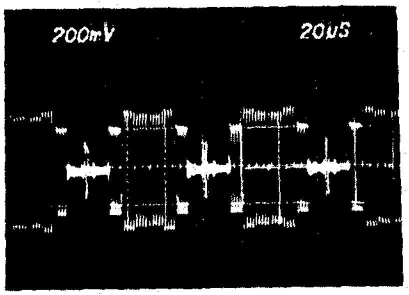
**TP28 (PB, REC)**



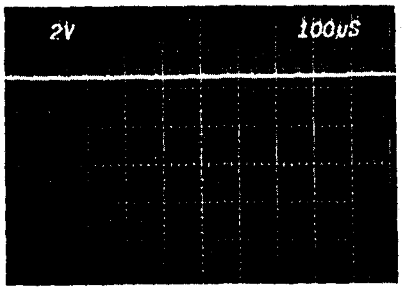
**TP28 (PB)**



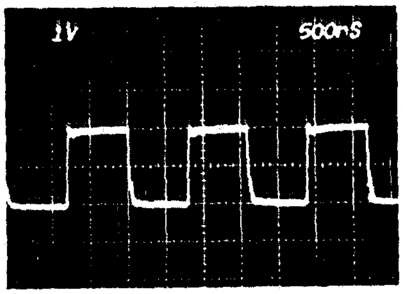
**TP28 (REC)**



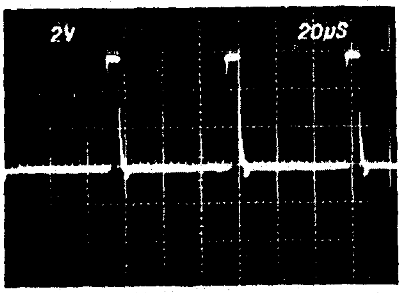
**TP31 DC (EE, PB)**



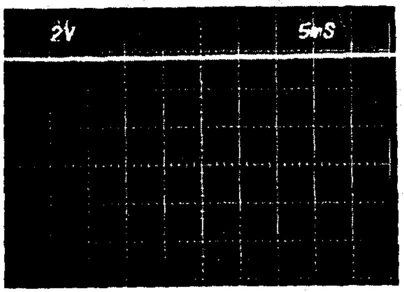
**TP32 (EE, PB)**



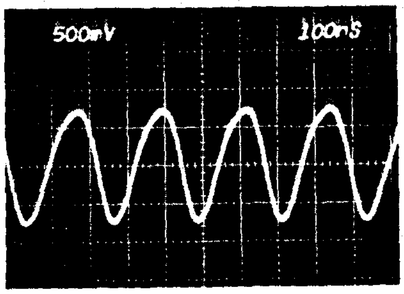
**TP33 (EE, PB)**



**TP34 DC (EE, PB)**



**TP35 (PB)**

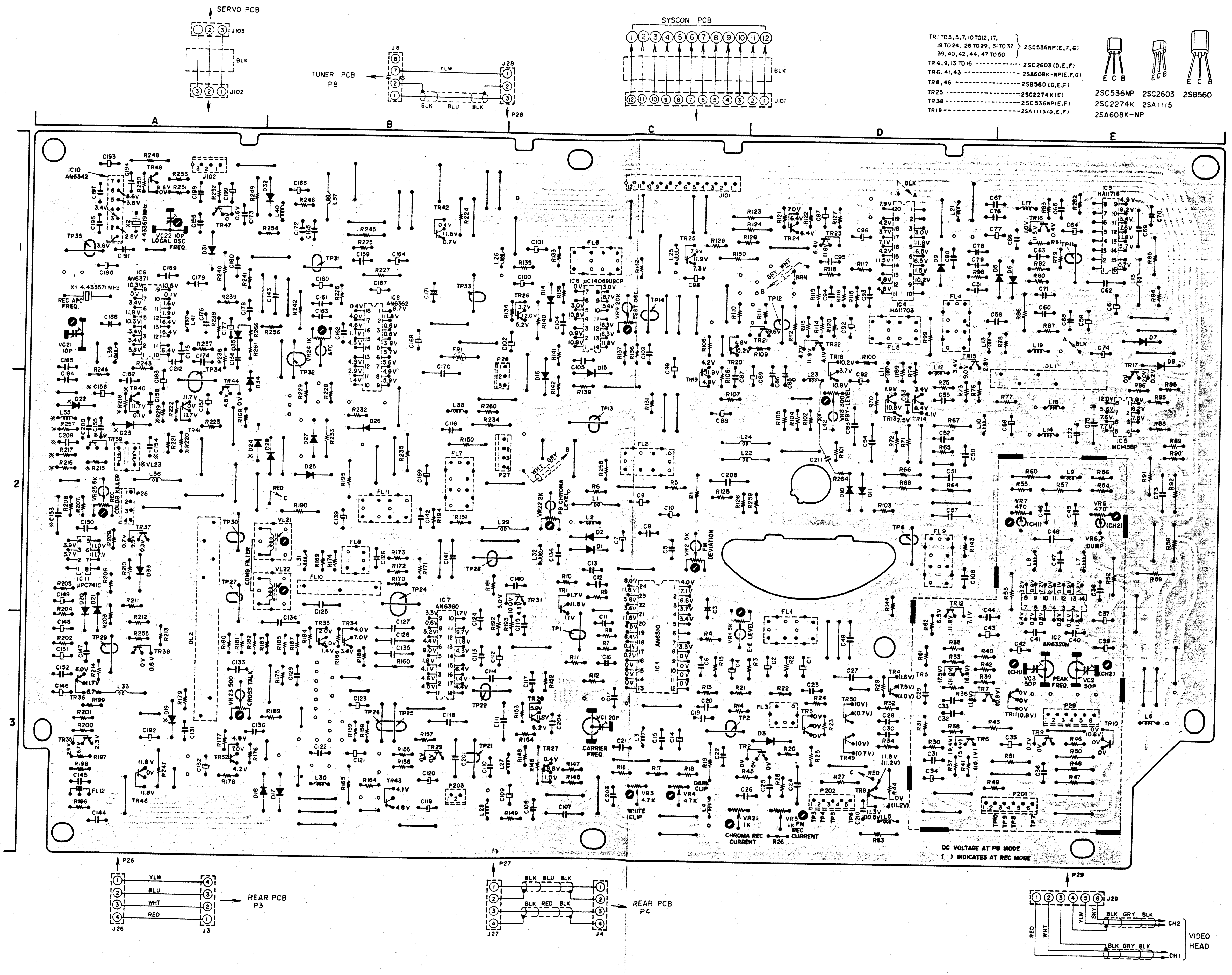


# XII. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

| P.C Board Title | P.C Board Number |
|---|---|
| Video P.C Board | V1004A5420 |
| Audio P.C Board | V1004A5350 |
| Servo P.C Board | V1004A5340 |
| Syscon P.C Board | V1004A5341 |
| Display P.C Board | V1004A5440 |
| Drive P.C Board | V1004B5360 |
| Capstan Motor P.C Board | V1004B5491 |
| Drum Motor P.C Board | V1004B5490 |
| Rear P.C Board | V1004C5390 |
| Mic P.C Board | V1004C5380 |
| Memory P.C Board | V1004C5381 |
| Sensor P.C Board | V1004C5370 |
| Audio Head P.C Board | V1004D5410 |
| Full Erase P.C Board | V1004D5411 |
| Motor Filter P.C Board | V1004D5400 |
| CM Filter P.C Board | V1004D5500 |
| Power Supply P.C Board | KA240178 |
| Tuner P.C Board | |
| Power Sub P.C Board | |
| TR P.C Board | |
| RS SW P.C Board | V1004C5371 |
| SW A P.C Board | V1004C5372 |
| SW B P.C Board | V1004C5373 |
| EJ.S SW P.C Board | V1004C5374 |
| Lower Drum P.C Board | VS-8068 |
| Upper Drum P.C Board | VS-8012 |

# XIII. COMPOSITION OF VARIOUS P.C BOARDS

## 1. VIDEO P.C BOARD V1004A5420 (2ED)


SERVO PCB
J103
BLK
J102
TUNER PCB
P8
J8
J28
YLW
BLK
BLU
P28
SYSCON PCB
J101
A
B
C
D
E
1
2
3
E C B
2SC536NP
2SC2274K
2SA608K-NP
2SC2603
2SA1115
2SB560
P26
YLW
BLU
WHT
RED
J26
J3
REAR PCB
P3
P27
BLK
BLU
RED
J27
J4
REAR PCB
P4
P29
J29
SKY
GRY
CH2
CH1
VIDEO
HEAD

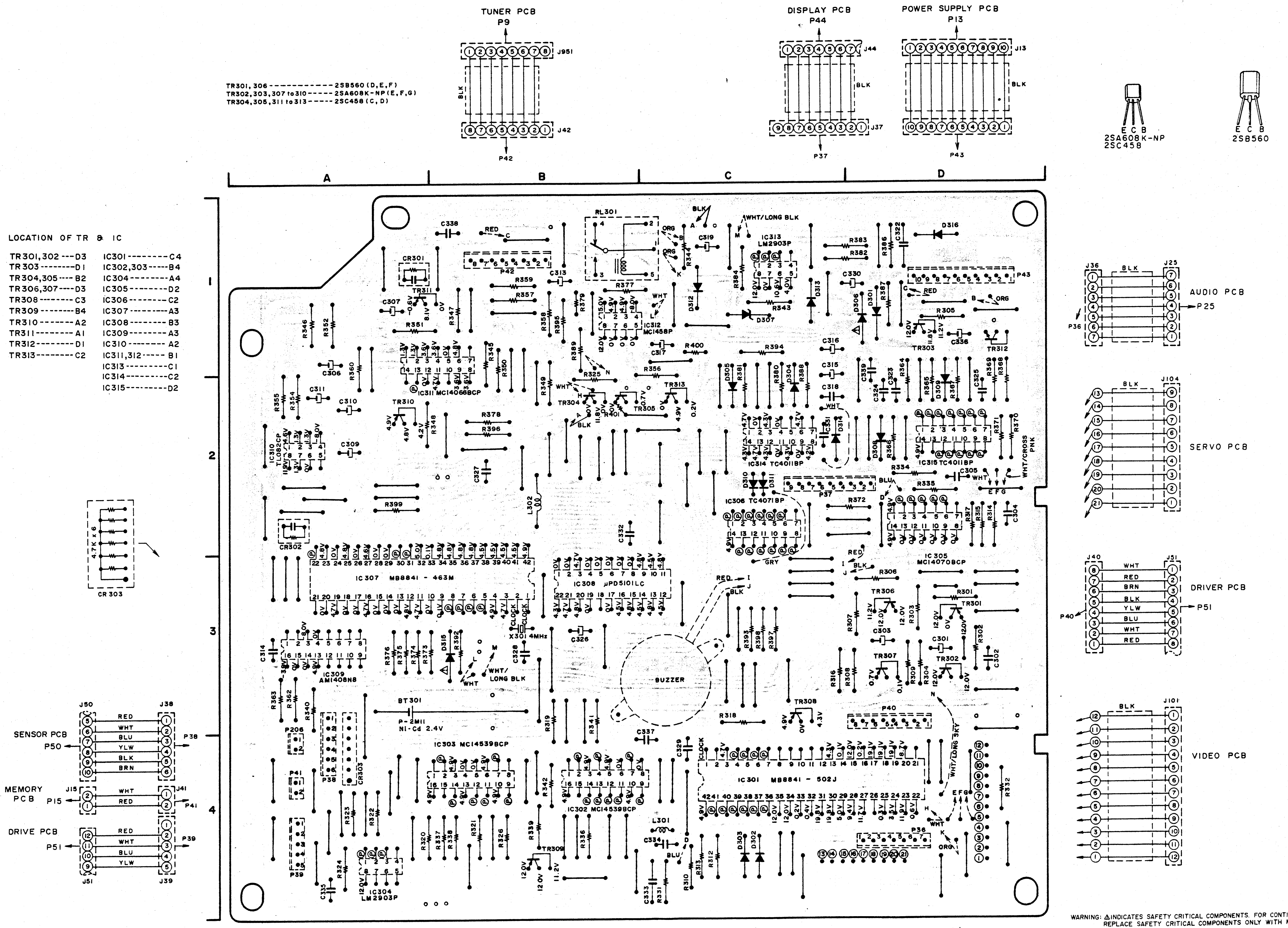
| | |
|---|---|
| TR1 TO 3, 5, 7, 10 TO 12, 17,<br>19 TO 24, 26 TO 29, 31 TO 37<br>39, 40, 42, 44, 47 TO 50 | 2SC536NP(E, F, G) |
| TR4, 9, 13 TO 16 | 2SC2603(D, E, F) |
| TR6, 41, 43 | 2SA608K-NP(E, F, G) |
| TR8, 46 | 2SB560 (D, E, F) |
| TR25 | 2SC2274K(E) |
| TR38 | 2SC536NP(E, F) |
| TR18 | 2SA1115(D, E, F) |

DC VOLTAGE AT PB MODE
( ) INDICATES AT REC MODE

LOCATION OF TR & IC

| | |
|---|---|
| TR1 | C2 |
| TR2 TO 8 | D3 |
| TR9 TO 11 | E3 |
| TR12 TO 14 | D2 |
| TR15 | D1 |
| TR16, 17 | E1 |
| TR18 | D1 |
| TR19, 20 | C1 |
| TR21 TO 24 | D1 |
| TR25, 26 | C1 |
| TR27, 28 | C3 |
| TR29 | B3 |
| TR31 | C2 |
| TR32 | A3 |
| TR33, 34 | B3 |
| TR35, 36 | A3 |
| TR37 | A2 |
| TR38 | A3 |
| TR39 TO 41 | A2 |
| TR42 | B1 |
| TR43 | B3 |
| TR44 | A2 |
| TR46 | A3 |
| TR47, 48 | A1 |
| TR49, 50 | D3 |
| IC1 | C3 |
| IC2 | E2 |
| IC3 | E1 |
| IC4 | D1 |
| IC5 | E2 |
| IC6 | C1 |
| IC7 | B3 |
| IC8 | B1 |
| IC9, 10 | A1 |
| IC11 | A2 |

## 2. SYSCON P.C BOARD V1004A5341 (3ED)


TUNER PCB
P9
J951
J42
P42
BLK
DISPLAY PCB
P44
J44
J37
P37
POWER SUPPLY PCB
P13
J13
P43
E C B
2SA608K-NP
2SC458
2SB560
A
B
C
D
1
2
3
4
AUDIO PCB
J36
J25
P25
P36
SERVO PCB
J104
DRIVER PCB
J40
J51
P40
P51
WHT
RED
BRN
BLK
YLW
BLU
VIDEO PCB
J101
SENSOR PCB
P50
J50
J38
P38
MEMORY PCB
P15
J15
J41
P41
DRIVE PCB
P51
J51
J39
P39
4.7K x 6
CR303
IC301 MB8841 - 502J
IC302 MC14539BCP
IC303 MC14539BCP
IC304 LM2903P
IC305 MC14070BCP
IC306 TC4071BP
IC307 MB8841 - 463M
IC308 μPD5101LC
IC309 AM14O8N8
IC310 TL082CP
IC311 MC14066BCP
IC312 MC1458P
IC313 LM2903P
IC314 TC4011BP
IC315 TC4011BP
RL301
BT301
P-2M11
Ni-Cd 2.4V
X301 4MHz
BUZZER
WHT/LONG BLK
WHT/CROSS PNK
WHT/LONG SKY

TR301, 306 ---------------2SB560 (D, E, F)
TR302, 303, 307 to 310 -----2SA608K-NP (E, F, G)
TR304, 305, 311 to 313 -----2SC458 (C, D)

LOCATION OF TR & IC

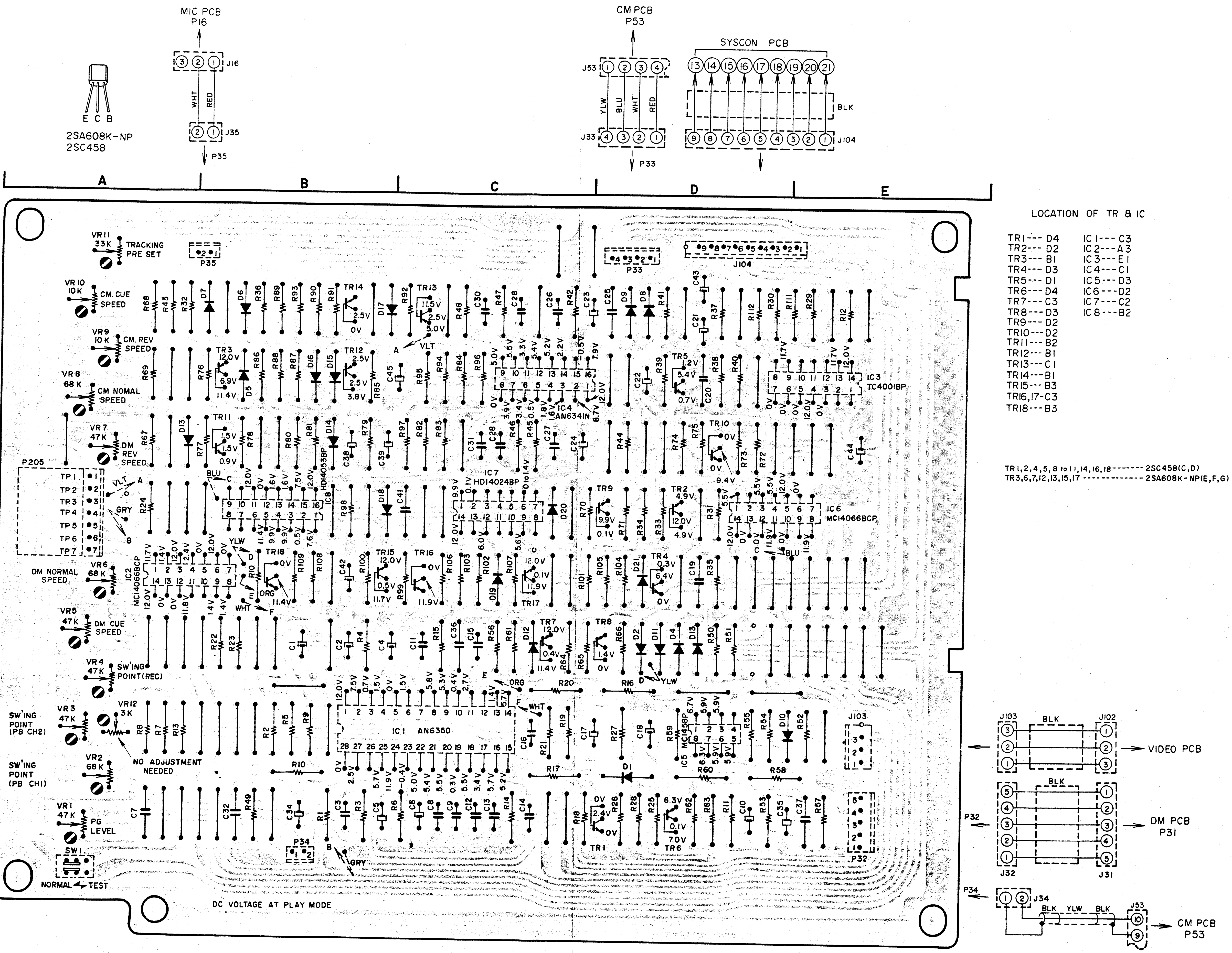
| | | | |
|---|---|---|---|
| TR301,302 | D3 | IC301 | C4 |
| TR303 | D1 | IC302,303 | B4 |
| TR304,305 | B2 | IC304 | A4 |
| TR306,307 | D3 | IC305 | D2 |
| TR308 | C3 | IC306 | C2 |
| TR309 | B4 | IC307 | A3 |
| TR310 | A2 | IC308 | B3 |
| TR311 | A1 | IC309 | A3 |
| TR312 | D1 | IC310 | A2 |
| TR313 | C2 | IC311,312 | B1 |
| | | IC313 | C1 |
| | | IC314 | C2 |
| | | IC315 | D2 |

DC VOLTAGE AT PB MODE.
Ⓟ INDICATES THAT TIMING PULSE
WILL BE DISPLAYED.

WARNING: △INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: △IL INDIQU LES COMPOSANTS CRITIQUES DE SÛRETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES CONPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

## 3. SERVO P.C BOARD V1004A5340


MIC PCB
P16
J16
WHT
RED
J35
P35
2SA608K-NP
2SC458
E C B
CM PCB
P53
J53
YLW
BLU
WHT
RED
J33
P33
SYSCON PCB
BLK
J104
A
B
C
D
E
1
2
3
4
VR11 33K TRACKING PRE SET
VR10 10K CM. CUE SPEED
VR9 10K CM. REV SPEED
VR8 68K CM NOMAL SPEED
VR7 47K DM REV SPEED
VR6 68K DM NORMAL SPEED
VR5 47K DM CUE SPEED
VR4 47K SW'ING POINT(REC)
VR3 47K SW'ING POINT (PB CH2)
VR12 3K NO ADJUSTMENT NEEDED
VR2 68K SW'ING POINT (PB CH1)
VR1 47K PG LEVEL
SW1
NORMAL TEST
P205
TP1
TP2
TP3
TP4
TP5
TP6
TP7
VLT
GRY
BLU
YLW
ORG
WHT
IC1 AN6350
IC2 MC14066BCP
IC3 TC4001BP
IC4 AN6341N
IC5 MC1458P
IC6 MC14066BCP
IC7 HD14024BP
IC8 HD14053BP
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
P32
P33
P34
P35
J103
J104
J102
BLK
VIDEO PCB
J32
J31
DM PCB
P31
P34
J34
BLK
YLW
BLK
J53
CM PCB
P53

DC VOLTAGE AT PLAY MODE

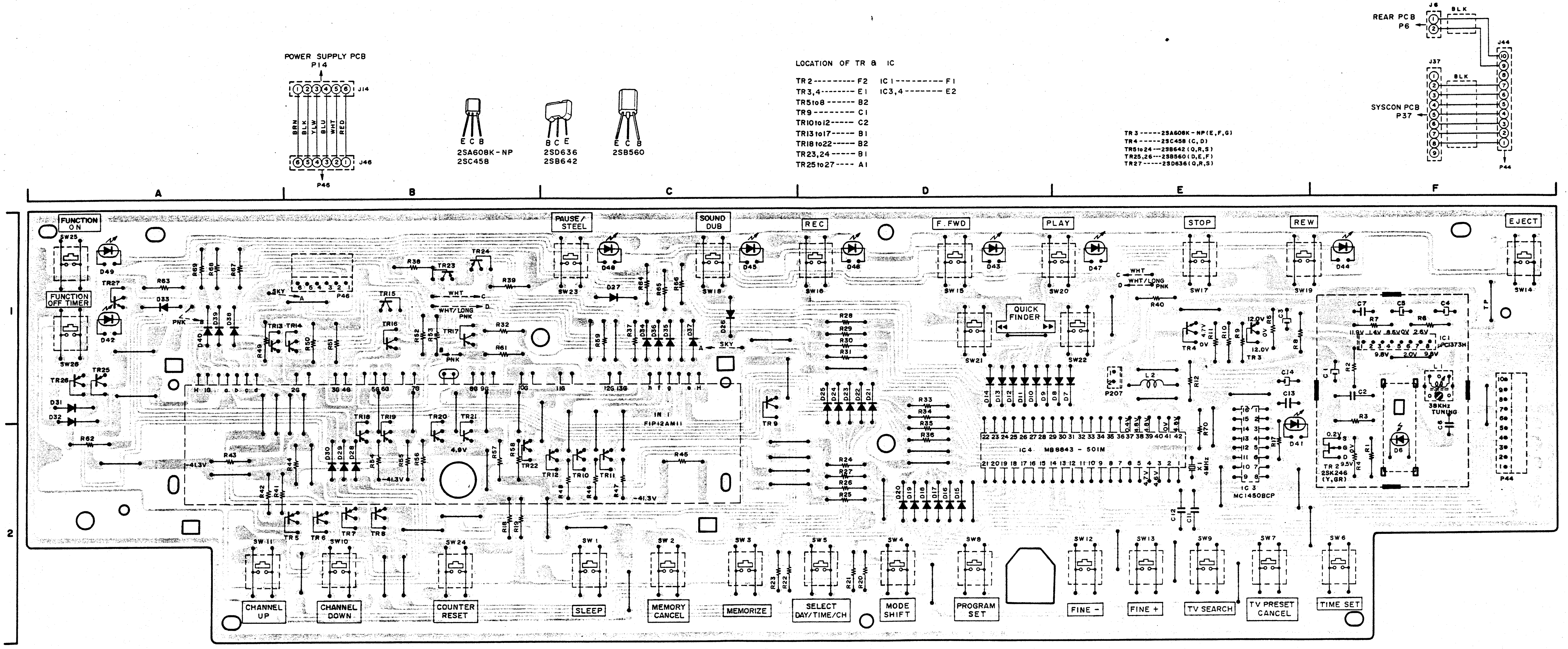
LOCATION OF TR & IC

TR1--- D4
TR2--- D2
TR3--- B1
TR4--- D3
TR5--- D1
TR6--- D4
TR7--- C3
TR8--- D3
TR9--- D2
TR10--- D2
TR11--- B2
TR12--- B1
TR13--- C1
TR14--- B1
TR15--- B3
TR16,17-C3
TR18--- B3

IC1--- C3
IC2--- A3
IC3--- E1
IC4--- C1
IC5--- D3
IC6--- D2
IC7--- C2
IC8--- B2

TR1,2,4,5,8 to 11,14,16,18------- 2SC458(C,D)
TR3,6,7,12,13,15,17 ------------- 2SA608K-NP(E,F,G)

## 4. DISPLAY P.C BOARD V1004A5440 (4ED)


POWER SUPPLY PCB
P14
J14
BRN
BLK
YLW
BLU
WHT
RED
J46
P46
E C B
2SA608K-NP
2SC458
B C E
2SD636
2SB642
E C B
2SB560
REAR PCB
P6
J6
BLK
J44
J37
SYSCON PCB
P37
P44
A
B
C
D
E
F
1
2
FUNCTION ON
FUNCTION OFF TIMER
PAUSE/ STEEL
SOUND DUB
REC
F. FWD
PLAY
STOP
REW
EJECT
QUICK FINDER
IC4 MB8843 - 501M
IC3 MC14508CP
IC1 µPC1373H
38KHz TUNING
TR2 2SK246 (Y,GR)
IN1 FIP12AM11
CHANNEL UP
CHANNEL DOWN
COUNTER RESET
SLEEP
MEMORY CANCEL
MEMORIZE
SELECT DAY/TIME/CH
MODE SHIFT
PROGRAM SET
FINE -
FINE +
TV SEARCH
TV PRESET CANCEL
TIME SET

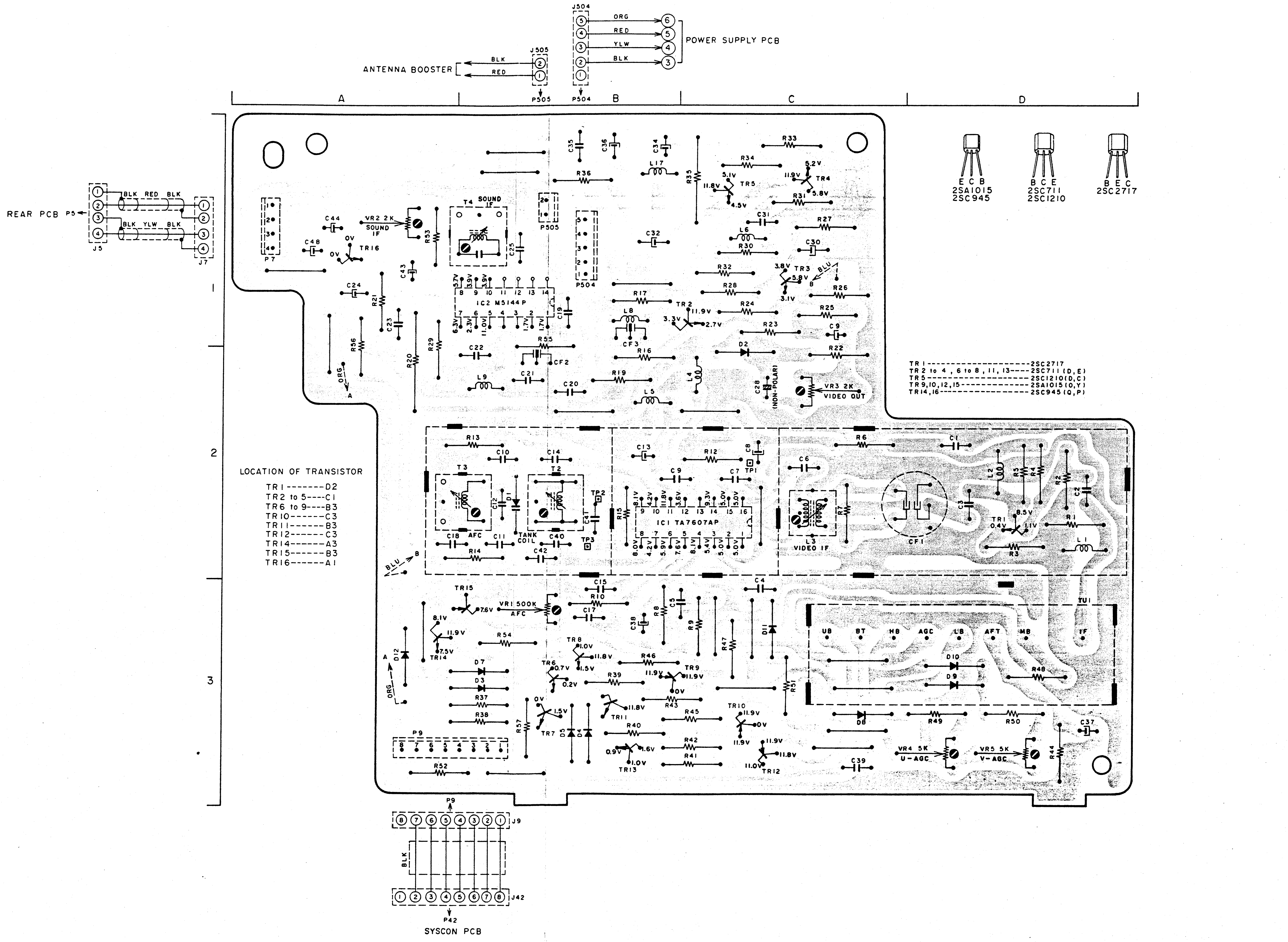
LOCATION OF TR & IC

TR2---------- F2
TR3,4--------- E1
TR5to8 ------- B2
TR9---------- C1
TR10to12------ C2
TR13to17------ B1
TR18to22------ B2
TR23,24------ B1
TR25to27---- A1

IC1----------- F1
IC3,4-------- E2

TR3------2SA608K-NP(E,F,G)
TR4------2SC458 (C,D)
TR5to24---2SB642(Q,R,S)
TR25,26---2SB560(D,E,F)
TR27------2SD636(Q,R,S)

# 5. TUNER P.C BOARD (EG)

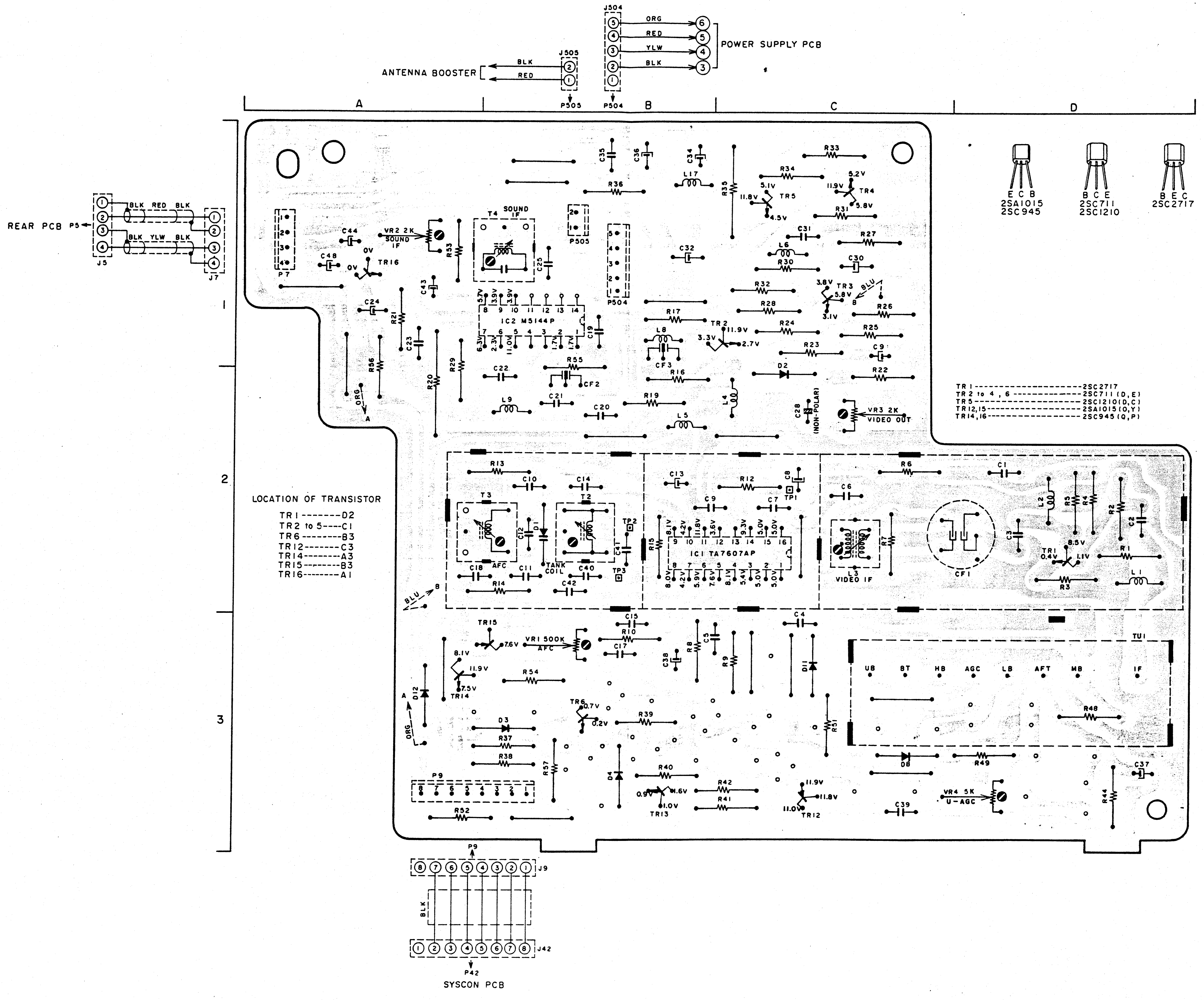

J504
ORG
RED
YLW
BLK
POWER SUPPLY PCB
J505
BLK
RED
ANTENNA BOOSTER
P505
P504
A
B
C
D
1
2
3
REAR PCB
P5
J5
J7
BLK RED BLK
BLK YLW BLK
E C B
2SA1015
2SC945
B C E
2SC711
2SC1210
B E C
2SC2717
IC2 M5144P
IC1 TA7607AP
T4 SOUND IF
VR2 2K SOUND IF
T3
T2
AFC
TANK COIL
L3 VIDEO IF
VR3 2K VIDEO OUT
CF1
CF2
CF3
TU1
UB
BT
HB
AGC
LB
AFT
MB
IF
VR1 500K AFC
VR4 5K U-AGC
VR5 5K V-AGC
P7
P9
J9
BLK
J42
P42
SYSCON PCB
ORG
BLU
NON-POLARI

LOCATION OF TRANSISTOR

| | |
|---|---|
| TR1 | D2 |
| TR2 to 5 | C1 |
| TR6 to 9 | B3 |
| TR10 | C3 |
| TR11 | B3 |
| TR12 | C3 |
| TR14 | A3 |
| TR15 | B3 |
| TR16 | A1 |

| | |
|---|---|
| TR1 | 2SC2717 |
| TR2 to 4, 6 to 8, 11, 13 | 2SC711 (D, E) |
| TR5 | 2SC1210 (D, C) |
| TR9, 10, 12, 15 | 2SA1015 (O, Y) |
| TR14, 16 | 2SC945 (Q, P) |

## 6. TUNER P.C BOARD (EK)

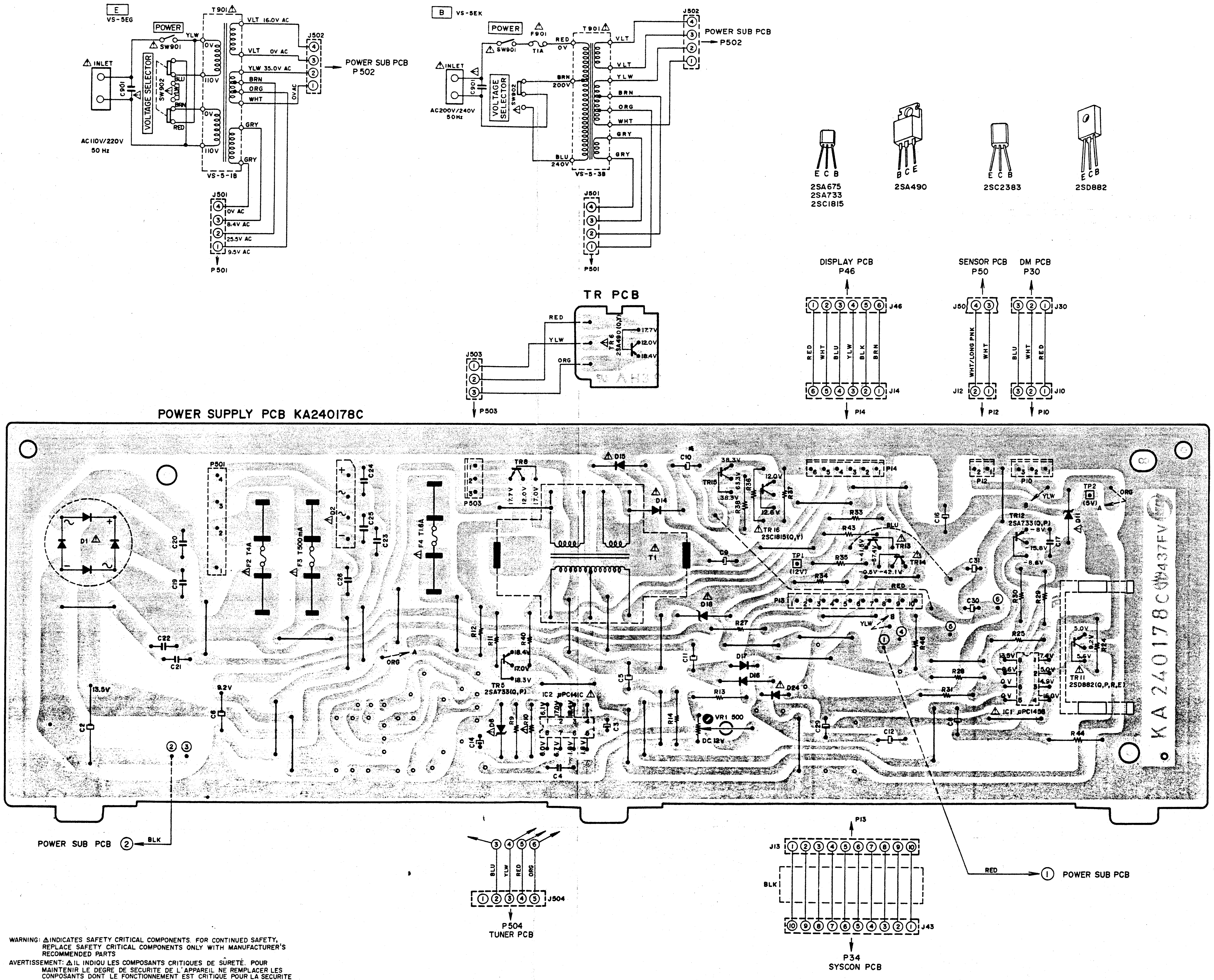

J504
ORG
RED
YLW
BLK
POWER SUPPLY PCB
J505
BLK
RED
ANTENNA BOOSTER
P505
P504
A
B
C
D
1
2
3
REAR PCB P5
BLK RED BLK
BLK YLW BLK
J5
J7
P7
C44
C48
VR2 2K SOUND IF
TR16
0V
T4 SOUND IF
R53
C25
IC2 M5144P
C24
R21
C23
C43
C19
R56
R29
R20
C22
R55
CF2
L9
C21
C20
ORG
R36
C35
C36
C34
L17
R35
R34
R33
TR4
TR5
R31
R27
C31
L6
R30
C30
C32
R32
TR3
BLU
R28
R26
R17
TR2
R24
R25
L8
CF3
R16
R23
C9
D2
R22
R19
L4
L5
C28 (NON-POLAR)
VR3 2K VIDEO OUT
E C B
2SA1015
2SC945
B C E
2SC711
2SC1210
B E C
2SC2717
R13
C10
C14
T3
T2
C12
D1
TP2
C41
C18
AFC
C11
TANK COIL
C40
TP3
R14
C42
BLU
C13
R12
C8
C7 TP1
R15
IC1 TA7607AP
R6
C6
C1
L3 VIDEO IF
R7
CF1
C3
L2
R5
R4
R2
C2
TR1
R1
R3
L1
TR15
VR1 500K AFC
C15
R10
C17
C4
C5
R8
C38
R9
D11
TU1
UB
BT
HB
AGC
LB
AFT
MB
IF
TR14
D12
R54
TR6
D3
R39
R37
R38
R51
R48
D8
R49
C37
R57
D4
R40
R42
R41
TR13
TR12
VR4 5K U-AGC
C39
R44
P9
R52
J9
BLK
J42
P42
SYSCON PCB

LOCATION OF TRANSISTOR

TR1 --------- D2
TR2 to 5 ---- C1
TR6 --------- B3
TR12 -------- C3
TR14 -------- A3
TR15 -------- B3
TR16 -------- A1

TR1 ---------------------- 2SC2717
TR2 to 4, 6 -------------- 2SC711 (D, E)
TR5 ---------------------- 2SC1210 (D, C)
TR12, 15 ----------------- 2SA1015 (O, Y)
TR14, 16 ----------------- 2SC945 (Q, P)

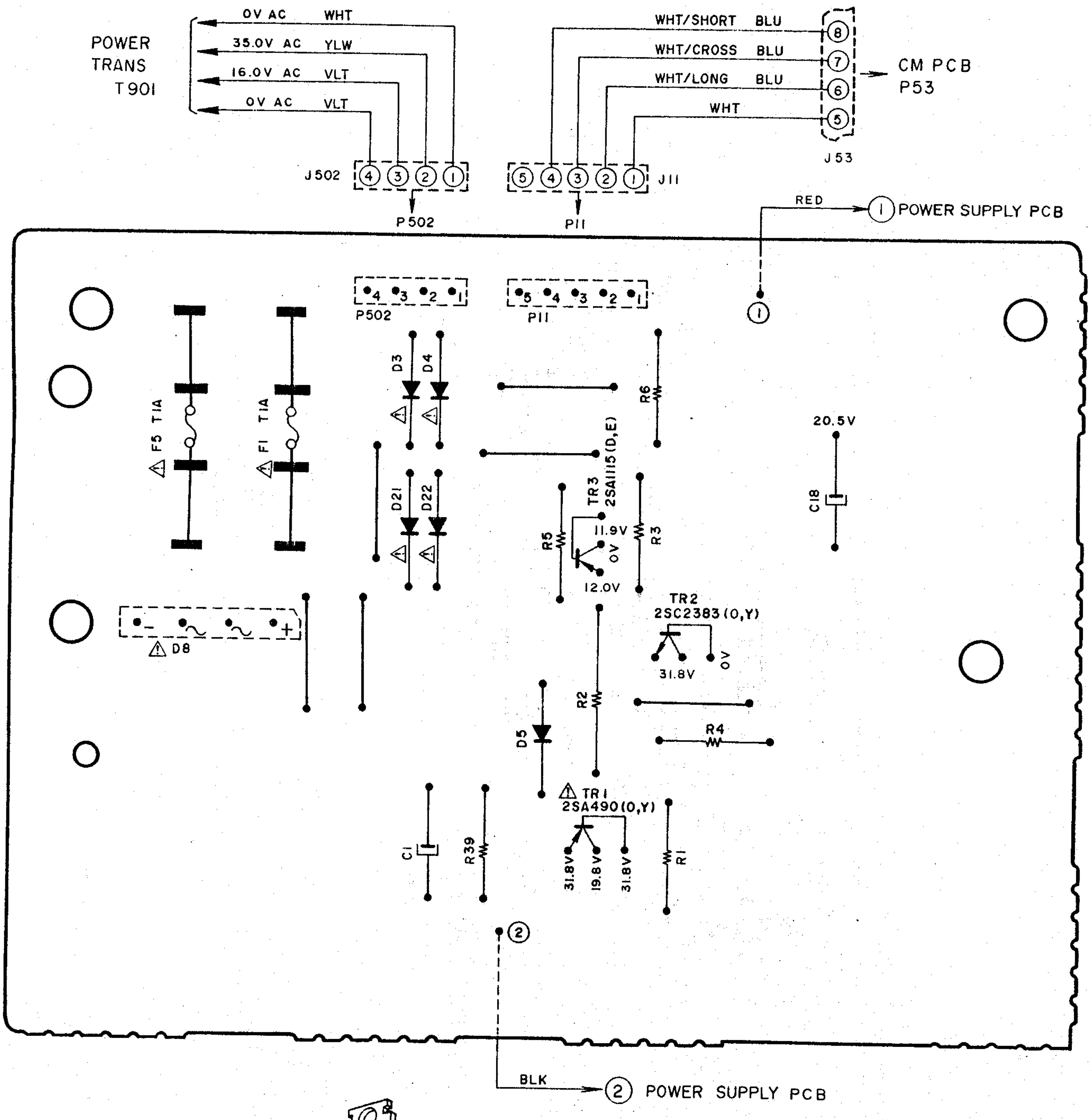
## 7. POWER SUPPLY P.C BOARD KA240178C and TR P.C BOARD

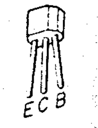

E
VS-5EG
POWER
SW901
INLET
C901
VOLTAGE SELECTOR
SW902
AC110V/220V
50 Hz
T901
VLT 16.0V AC
VLT 0V AC
YLW 35.0V AC
BRN
ORG
WHT
GRY
0V AC
110V
0V
VS-5-18
J502
POWER SUB PCB
P 502
J501
0V AC
8.4V AC
25.5V AC
9.5V AC
P501
B
VS-5EK
F901
T1A
RED
AC200V/240V
50Hz
200V
240V
VS-5-38
TR PCB
TR6
2SA490(O,Y)
17.7V
12.0V
18.4V
J503
P503
2SA675
2SA733
2SC1815
2SA490
2SC2383
2SD882
E C B
B C E
DISPLAY PCB
P46
J46
J14
P14
SENSOR PCB
P50
DM PCB
P30
J50
J30
J12
J10
P12
P10
WHT/LONG PNK
BLU
YLW
BLK
POWER SUPPLY PCB KA240178C
KA 240178C
D1
F2 T4A
F3 T500mA
F4 T1.6A
D2
D15
D14
T1
TR8
TR15
TR16 2SC1815(O,Y)
TR13
TR14
TR12 2SA733(Q,P)
TR11 2SD882(Q,P,R,E)
TR5 2SA733(Q,P)
IC2 μPC141C
IC1 μPC1458
VR1 500
DC 12V
TP1 (12V)
TP2 (5V)
D11
D16
D17
D18
D24
13.5V
9.2V
38.3V
12.0V
12.8V
POWER SUB PCB ②
P504
TUNER PCB
J504
P13
J13
J43
P34
SYSCON PCB
POWER SUB PCB ①

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

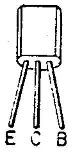
AVERTISSEMENT: ⚠IL INDIQU LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES CONPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

# 8. POWER SUB P.C BOARD

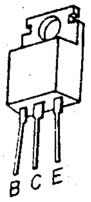

POWER
TRANS
T901
0V AC
WHT
35.0V AC
YLW
16.0V AC
VLT
0V AC
VLT
J502
P502
WHT/SHORT
BLU
WHT/CROSS
BLU
WHT/LONG
BLU
WHT
J53
CM PCB
P53
J11
P11
RED
POWER SUPPLY PCB
F5 T1A
F1 T1A
D3
D4
D21
D22
D8
R6
TR3
2SA1115 (D,E)
11.9V
0V
12.0V
R5
R3
20.5V
C18
TR2
2SC2383 (O,Y)
31.8V
0V
R2
R4
D5
TR1
2SA490 (O,Y)
31.8V
19.8V
31.8V
C1
R39
R1
BLK
POWER SUPPLY PCB



2SA1115



2SC2383

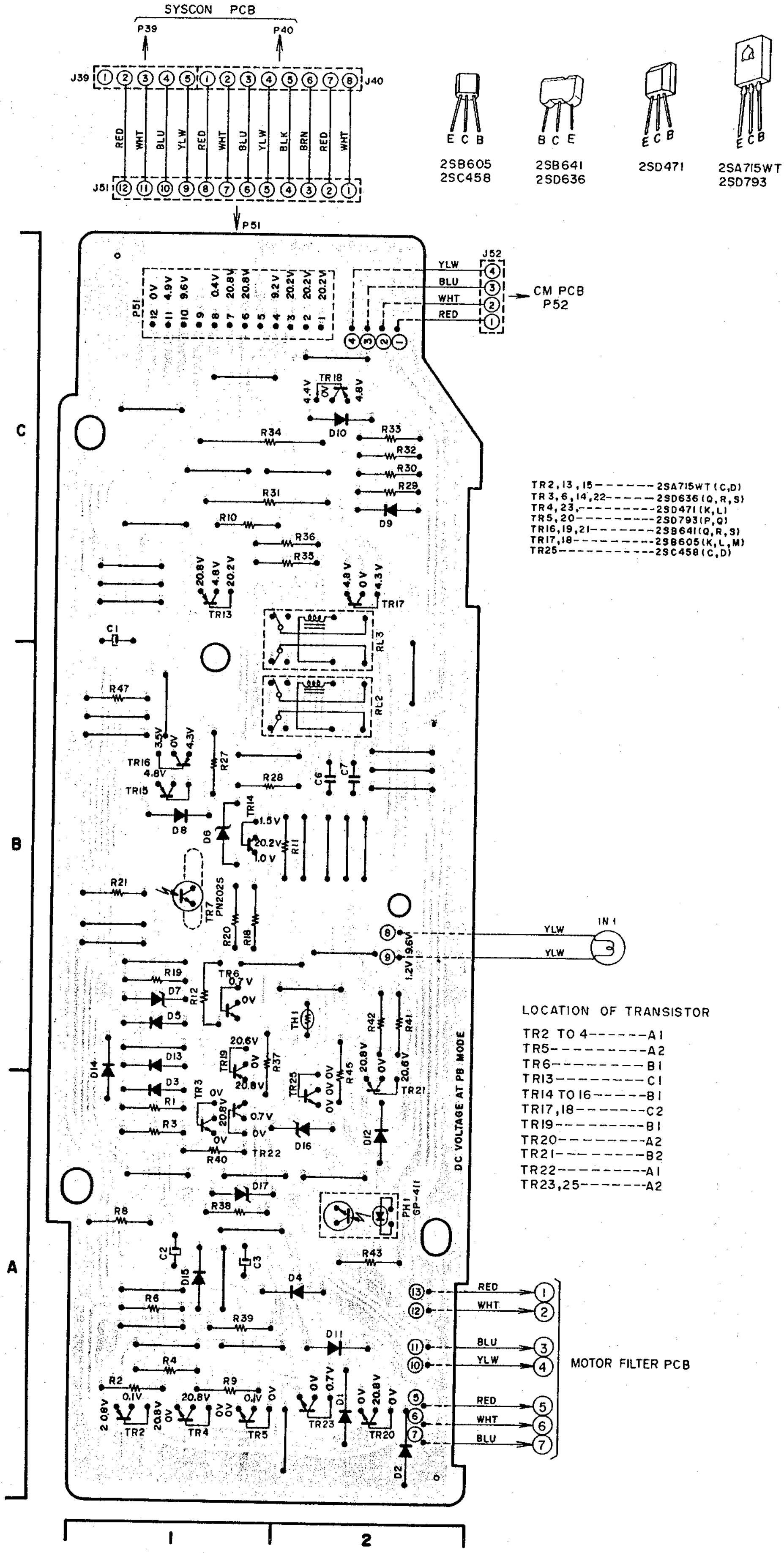


2SA490

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠ IL INDIQU LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES CONPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

## 9. DRIVE P.C BOARD V1004B5360

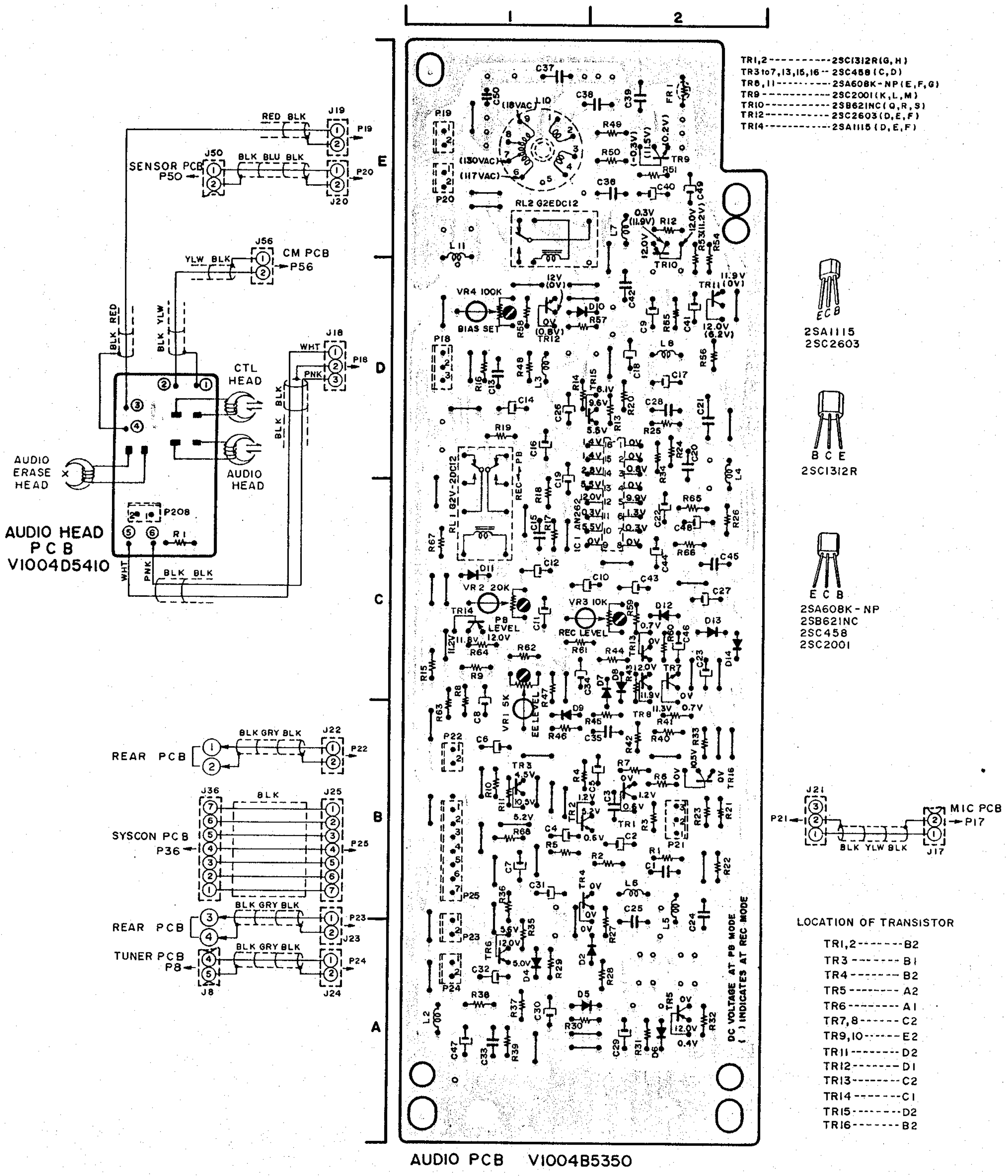

SYSCON PCB
P39
P40
J39
J40
J51
P51
RED
WHT
BLU
YLW
RED
WHT
BLU
YLW
BLK
BRN
RED
WHT
J52
YLW
BLU
WHT
RED
CM PCB
P52
E C B
2SB605
2SC458
B C E
2SB641
2SD636
E C B
2SD471
E C B
2SA715WT
2SD793
C
B
A
1
2
TR18
TR13
TR17
TR16
TR15
TR14
TR7
PN2025
TR6
TR19
TR3
TR25
TR21
TR22
TR2
TR4
TR5
TR23
TR20
RL3
RL2
TH1
PH1
GP-411
IN1
YLW
YLW
DC VOLTAGE AT PB MODE
RED
WHT
BLU
YLW
RED
WHT
BLU
MOTOR FILTER PCB

TR2, 13, 15 -------- 2SA715WT (C,D)
TR3, 6, 14, 22 -------- 2SD636 (Q, R, S)
TR4, 23, ------------ 2SD471 (K, L)
TR5, 20 ------------ 2SD793 (P, Q)
TR16, 19, 21 ----------- 2SB641 (Q, R, S)
TR17, 18 ------------ 2SB605 (K, L, M)
TR25 ---------------- 2SC458 (C, D)

LOCATION OF TRANSISTOR

TR2 TO 4 -------- A1
TR5 ------------ A2
TR6 ------------ B1
TR13 ------------ C1
TR14 TO 16 -------- B1
TR17, 18 ---------- C2
TR19 ------------ B1
TR20 ------------ A2
TR21 ------------ B2
TR22 ------------ A1
TR23, 25 ---------- A2

## 10. AUDIO P.C BOARD V1004B5350 (3ED) and AUDIO HEAD P.C BOARD V1004D5410

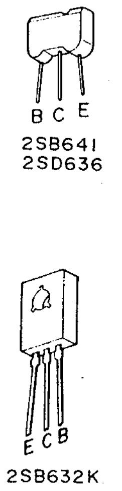

SENSOR PCB P50
J19 P19
J50 J20 P20
RED BLK
BLK BLU BLK
J56 CM PCB P56
YLW BLK
J18 P18
WHT PNK
CTL HEAD
AUDIO HEAD
AUDIO ERASE HEAD
P208
R1
AUDIO HEAD PCB V1004D5410
REAR PCB
J22 P22
BLK GRY BLK
SYSCON PCB P36
J36 J25 P25
BLK
REAR PCB
P23 J23
TUNER PCB P8
J8 J24 P24
J21 P21 MIC PCB P17 J17
BLK YLW BLK
A B C D E
1 2
RL2 G2EDC12
RL1 G2V-2DC12
IC1 AN262
VR4 100K BIAS SET
VR2 20K PB LEVEL
VR3 10K REC LEVEL
VR1 5K EE LEVEL
(18VAC) (130VAC) (117VAC)
DC VOLTAGE AT PB MODE
( ) INDICATES AT REC MODE
ECB
2SA1115
2SC2603
BCE
2SC1312R
ECB
2SA608K-NP
2SB621NC
2SC458
2SC2001
AUDIO PCB V1004B5350

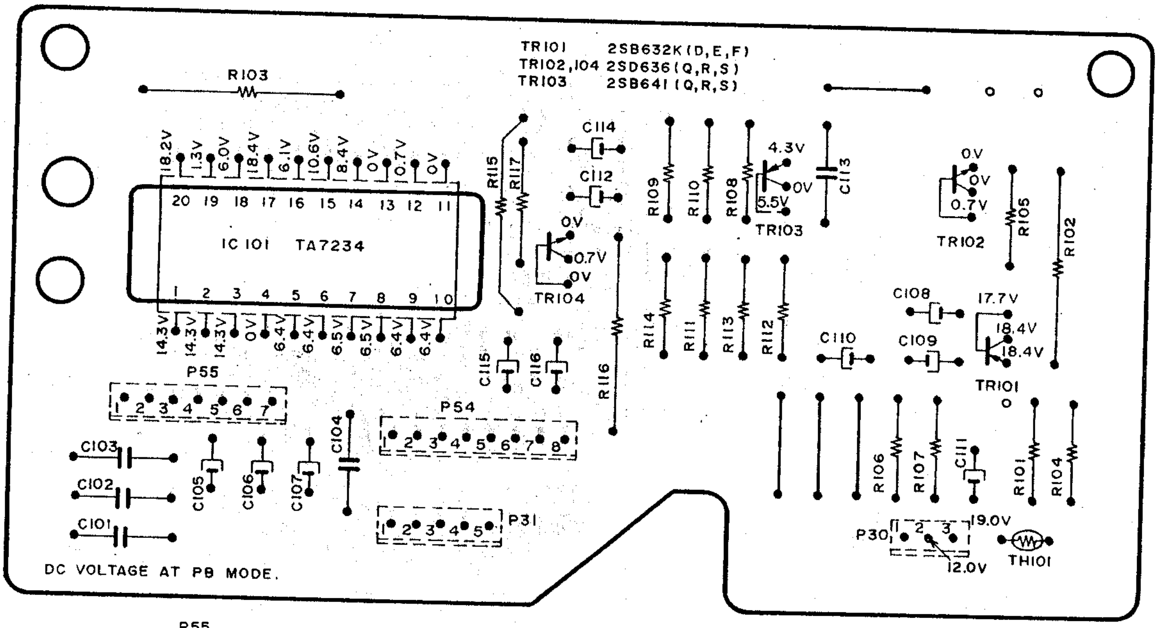
TR1,2-------------2SC1312R(G,H)
TR3to7,13,15,16-- 2SC458(C,D)
TR8,11-------------2SA608K-NP(E,F,G)
TR9---------------2SC2001(K,L,M)
TR10-------------2SB621NC(Q,R,S)
TR12-------------2SC2603(D,E,F)
TR14-------------2SA1115(D,E,F)

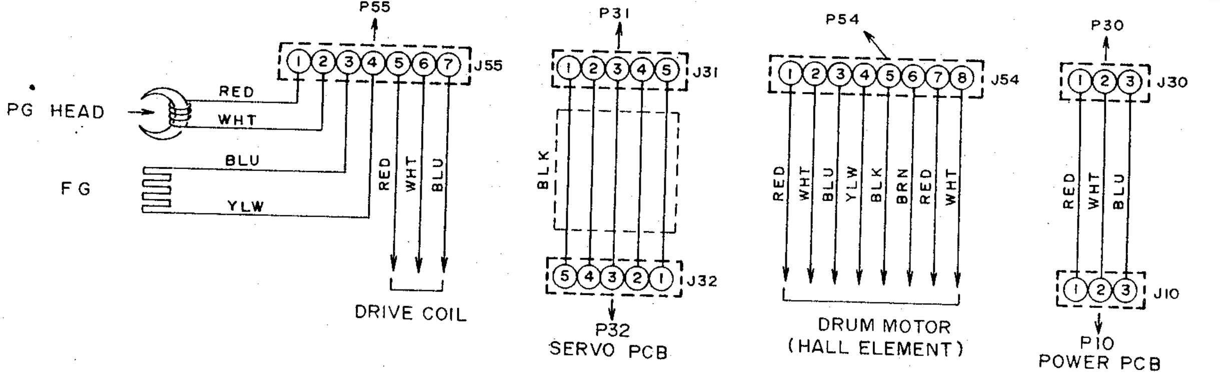
LOCATION OF TRANSISTOR

TR1,2--------B2
TR3---------B1
TR4---------B2
TR5---------A2
TR6---------A1
TR7,8-------C2
TR9,10------E2
TR11--------D2
TR12--------D1
TR13--------C2
TR14--------C1
TR15--------D2
TR16--------B2

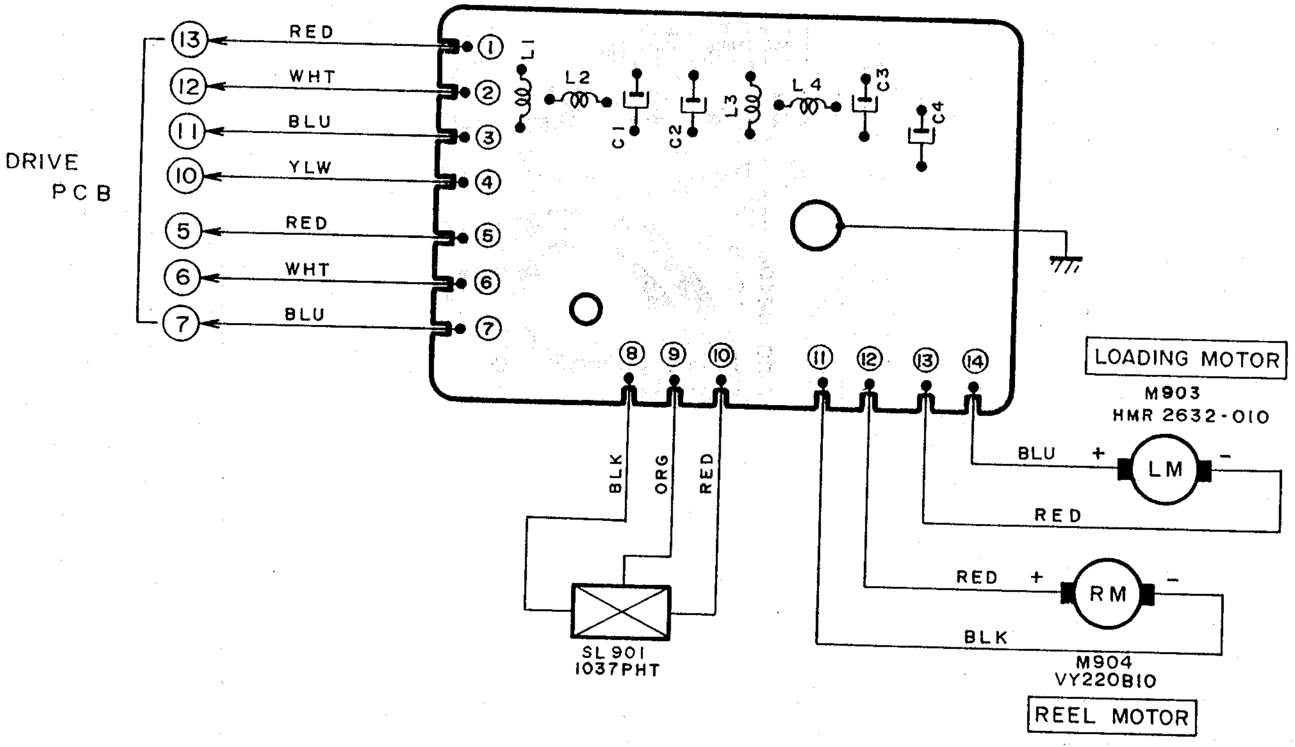
## 11. DRUM MOTOR P.C BOARD V1004B5490


B C E
2SB641
2SD636
E C B
2SB632K

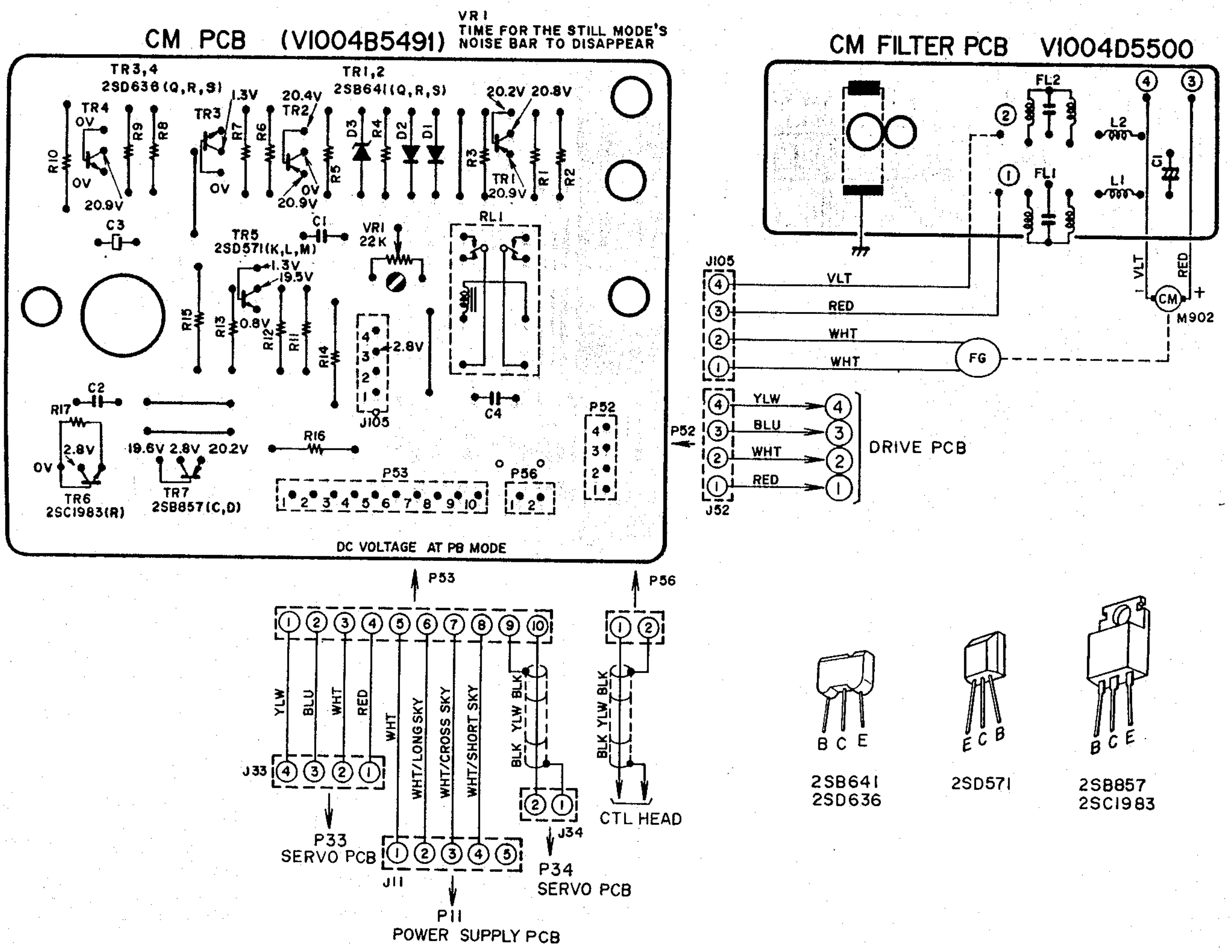

TR101 2SB632K(D,E,F)
TR102,104 2SD636(Q,R,S)
TR103 2SB641(Q,R,S)
R103
IC101 TA7234
18.2V
1.3V
6.0V
18.4V
6.1V
10.6V
18.4V
0V
10.7V
0V
14.3V
14.3V
14.3V
0V
6.4V
6.4V
6.5V
6.5V
6.4V
6.4V
R115
R117
C114
C112
TR104
0.7V
R109
R110
R108
4.3V
5.5V
TR103
C113
TR102
R105
R102
R114
R111
R113
R112
R116
C115
C116
C108
17.7V
18.4V
C110
C109
TR101
P55
P54
C103
C102
C101
C105
C106
C107
C104
P31
R106
R107
C111
R101
R104
P30
19.0V
12.0V
TH101
DC VOLTAGE AT PB MODE.


P55
J55
PG HEAD
RED
WHT
BLU
YLW
FG
RED
WHT
BLU
DRIVE COIL
P31
J31
BLK
J32
P32
SERVO PCB
P54
J54
RED
WHT
BLU
YLW
BLK
BRN
RED
WHT
DRUM MOTOR
(HALL ELEMENT)
P30
J30
RED
WHT
BLU
J10
P10
POWER PCB

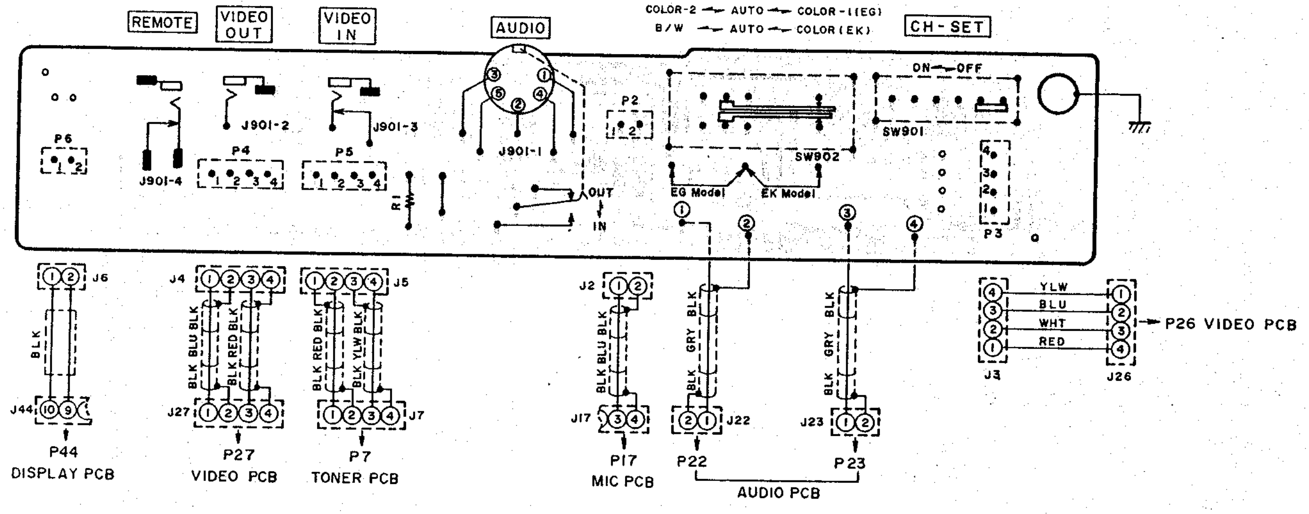
## 12. MOTOR FILTER P.C BOARD V1004D5400 (2ED)


DRIVE
PCB
⑬
⑫
⑪
⑩
⑤
⑥
⑦
RED
WHT
BLU
YLW
RED
WHT
BLU
L1
L2
L3
L4
C1
C2
C3
C4
⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭
BLK
ORG
RED
SL901
1037PHT
LOADING MOTOR
M903
HMR 2632-010
BLU
+
-
LM
RED
RED
+
-
RM
BLK
M904
VY220B10
REEL MOTOR

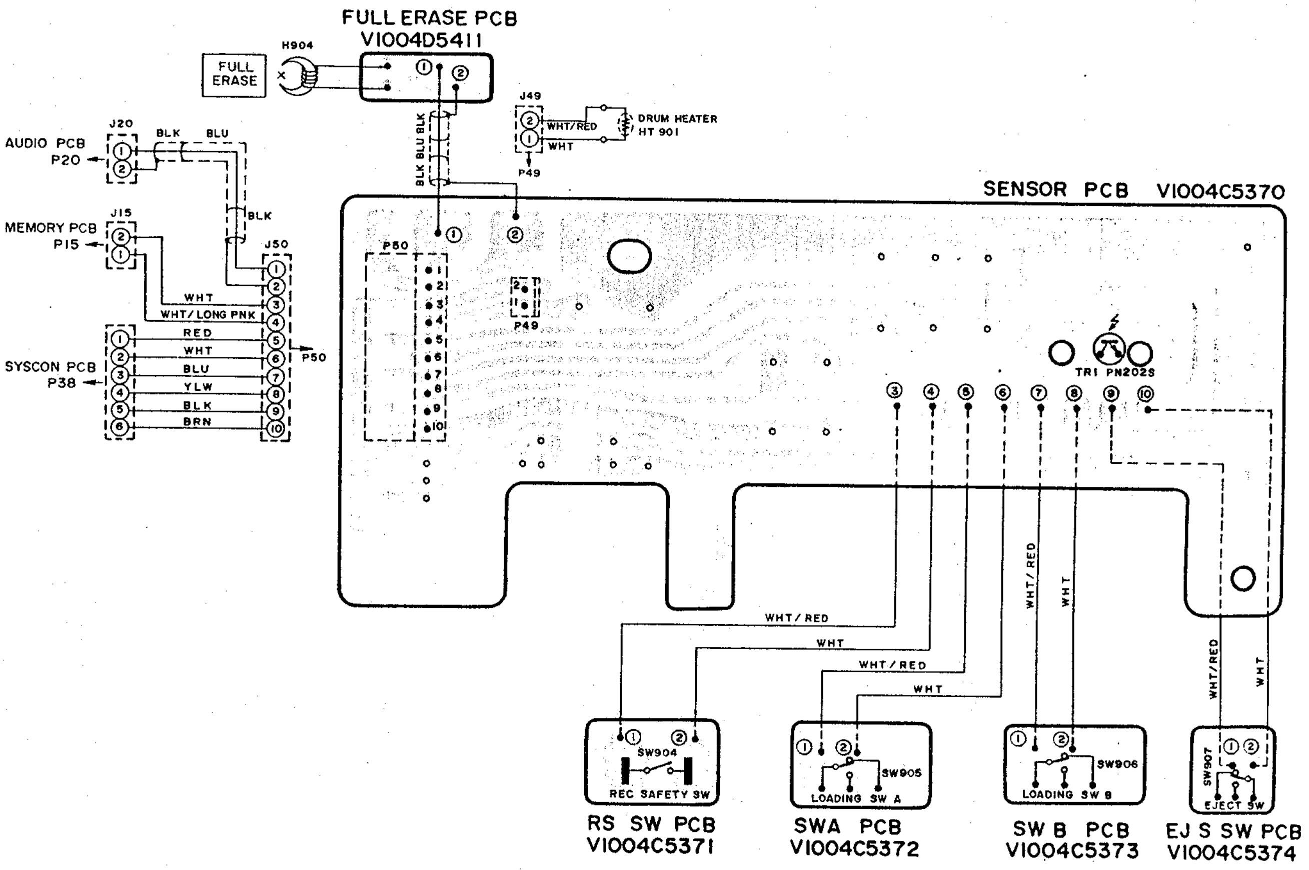
## 13. CM P.C BOARD V1004B5491 and CM FILTER P.C BOARD V1004D5500


CM PCB (V1004B5491)
VR1
TIME FOR THE STILL MODE'S NOISE BAR TO DISAPPEAR
CM FILTER PCB V1004D5500
TR3,4
2SD636(Q,R,S)
TR1,2
2SB641(Q,R,S)
TR4
TR3
TR2
TR1
1.3V
20.4V
20.2V
20.8V
0V
20.9V
R10
R9
R8
R7
R6
R5
R4
R3
R2
R1
D3
D2
D1
C3
C1
TR5
2SD571(K,L,M)
VR1
22K
RL1
1.3V
19.5V
0.8V
R15
R13
R12
R11
R14
2.8V
J105
C2
C4
R17
R16
TR6
2SC1983(R)
TR7
2SB857(C,D)
19.6V 2.8V 20.2V
P53
P56
P52
DC VOLTAGE AT PB MODE
FL2
FL1
L2
L1
C1
VLT
RED
WHT
WHT
FG
CM
M902
YLW
BLU
WHT
RED
DRIVE PCB
J52
P53
P56
YLW
BLU
WHT
RED
WHT
WHT/LONG SKY
WHT/CROSS SKY
WHT/SHORT SKY
BLK YLW BLK
BLK YLW BLK
J33
P33
SERVO PCB
J11
P11
POWER SUPPLY PCB
J34
P34
SERVO PCB
CTL HEAD
B C E
2SB641
2SD636
E C B
2SD571
B C E
2SB857
2SC1983

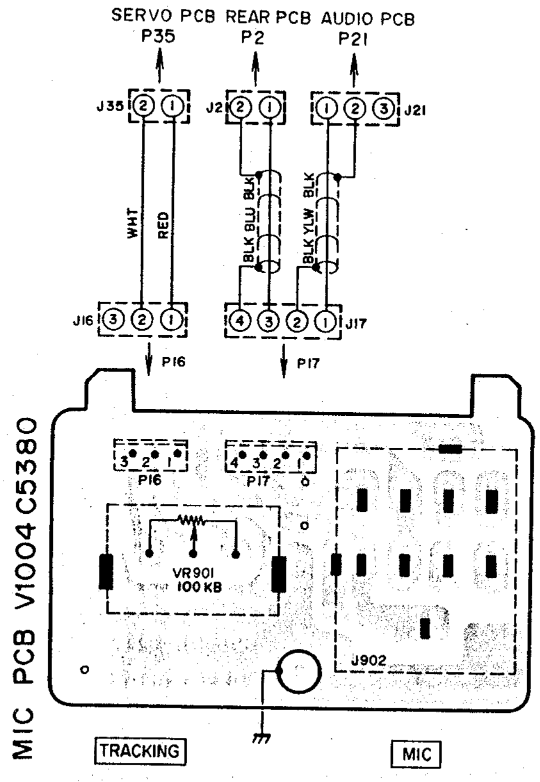
## 14. REAR P.C BOARD V1004C5390 (2ED)


REMOTE
VIDEO OUT
VIDEO IN
AUDIO
COLOR-2 ← AUTO → COLOR-1(EG)
B/W ← AUTO → COLOR(EK)
CH-SET
ON ← OFF
SW901
SW902
EG Model
EK Model
P6
J901-4
J901-2
J901-3
J901-1
P4
P5
P2
P3
R1
OUT
IN
J6
J4
J5
J2
J3
J26
YLW
BLU
WHT
RED
P26 VIDEO PCB
BLK
BLK BLU BLK
BLK RED BLK
BLK RED BLK
BLK YLW BLK
BLK BLU BLK
BLK GRY BLK
BLK GRY BLK
J44
J27
J7
J17
J22
J23
P44
DISPLAY PCB
P27
VIDEO PCB
P7
TONER PCB
P17
MIC PCB
P22
P23
AUDIO PCB

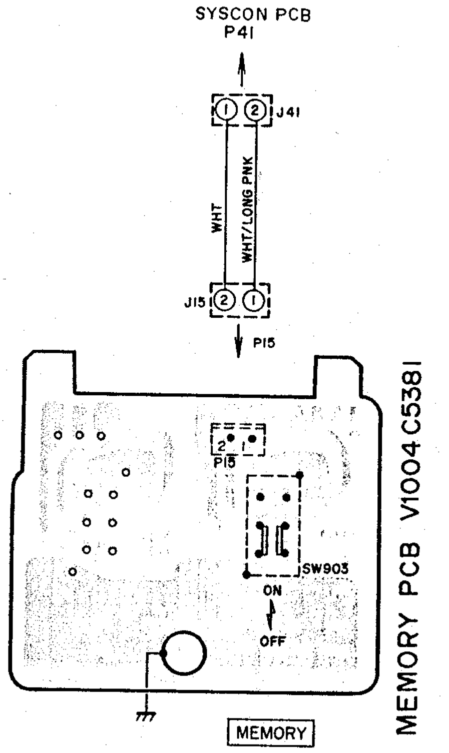
## 15. SENSOR P.C BOARD V1004C5370, FULL ERASE P.C BOARD V1004D5411, RS. SW P.C BOARD V1004C5371, SW A P.C BOARD V1004C5372, SW B P.C BOARD V1004C5373 and EJ.S SW P.C BOARD V1004C5374


FULL ERASE PCB
V1004D5411
H904
FULL ERASE
J49
P49
WHT/RED
WHT
DRUM HEATER
HT 901
J20
AUDIO PCB
P20
BLK
BLU
MEMORY PCB
P15
J15
J50
P50
WHT
WHT/LONG PNK
SYSCON PCB
P38
RED
WHT
BLU
YLW
BLK
BRN
BLK BLU BLK
SENSOR PCB V1004C5370
TR1 PN202S
WHT/RED
WHT
SW904
REC SAFETY SW
SW905
LOADING SW A
SW906
LOADING SW B
SW907
EJECT SW
RS SW PCB
V1004C5371
SWA PCB
V1004C5372
SW B PCB
V1004C5373
EJ S SW PCB
V1004C5374

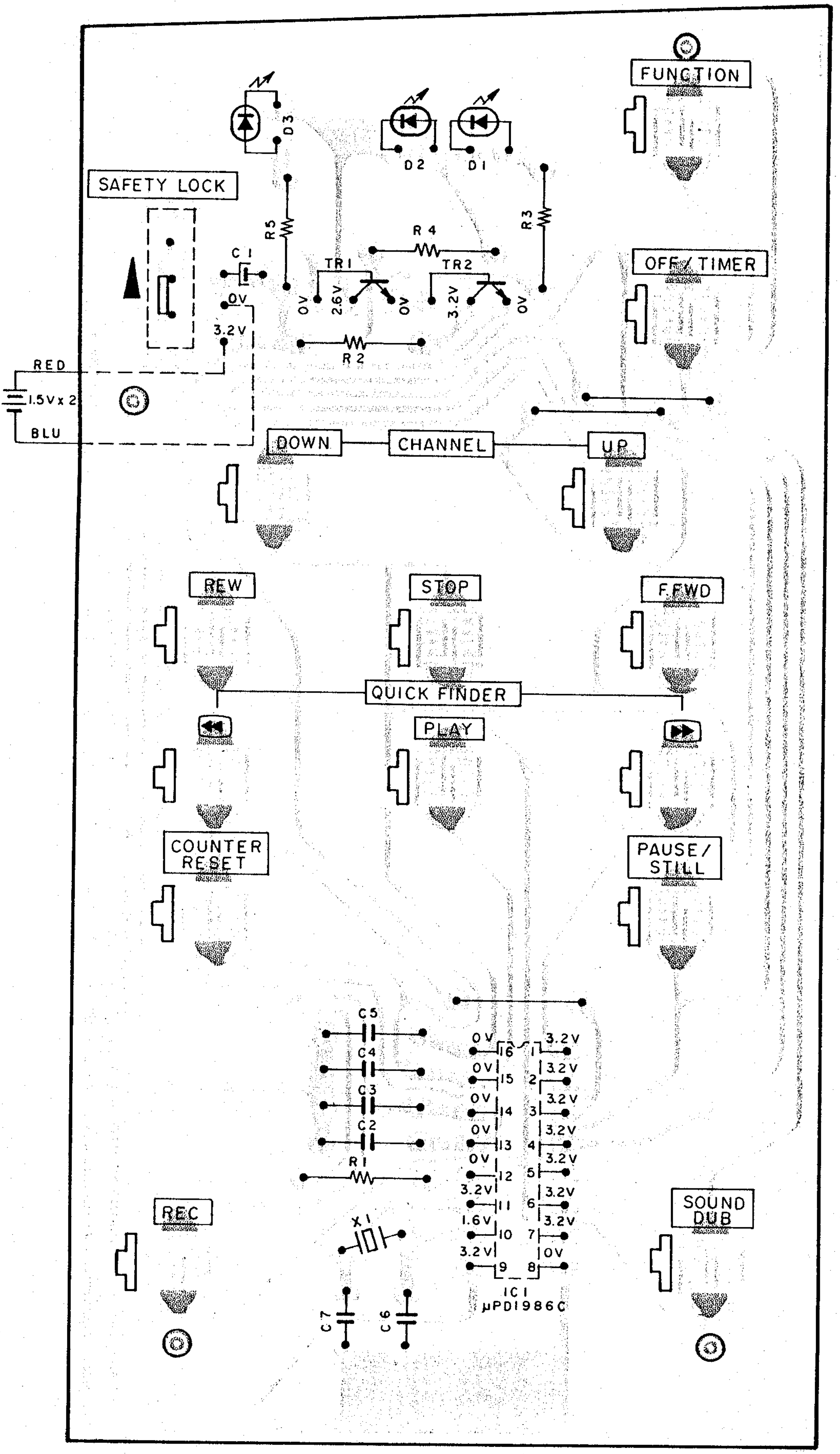
## 16. MIC P.C BOARD V1004C5380


SERVO PCB
P35
REAR PCB
P2
AUDIO PCB
P21
J35
J2
J21
WHT
RED
BLK BLU BLK
BLK YLW BLK
J16
J17
P16
P17
VR901
100 KB
J902
TRACKING
MIC
MIC PCB V1004C5380

## 17. MEMORY P.C BOARD V1004C5381


SYSCON PCB
P41
J41
WHT
WHT/LONG PNK
J15
P15
SW903
ON
OFF
MEMORY
MEMORY PCB V1004C5381

## 18. REMOTE CONTROL UNIT RC-V5


FUNCTION
D3
D2
D1
SAFETY LOCK
R5
R4
R3
C1
TR1
TR2
0V
2.6V
0V
3.2V
0V
OFF/TIMER
0V
3.2V
R2
RED
1.5V x 2
BLU
DOWN
CHANNEL
UP
REW
STOP
F.FWD
QUICK FINDER
PLAY
COUNTER RESET
PAUSE/STILL
C5
C4
C3
C2
R1
0V 16
0V 15
0V 14
0V 13
0V 12
3.2V 11
1.6V 10
3.2V 9
1 3.2V
2 3.2V
3 3.2V
4 3.2V
5 3.2V
6 3.2V
7 3.2V
8 0V
IC1
µPD1986C
REC
X1
C7
C6
SOUND DUB

## SECTION 2

# PARTS LIST

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20. POWER & RF BLOCK ............................ 112
21. FINAL ASSEMBLY BLOCK ........................ 114

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Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

## HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List

The reference number corresponds with illustration or photo number of that particular parts list.

This number corresponds with the Figure Number.

This number corresponds with the individual parts index number in that figure.

A small "x" indicates the inability to show that particular part in the Photo or Illustration.

**12-115x**

| Ref. No. | Parts No. | Description |
|---|---|---|
| | | **FLYWHEEL BLOCK #13** |
| 12-115x | 800425 | Flywheel Block Assy. Comp. |
| 12-116 | 244506 | Flywheel Only |
| 12-117x | 244754 | Felt, Flywheel |
| 12-118 | 251324 | Main Metal Case |
| 12-119 | 253080 | Main Metal |

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of Components of the Schematic Diagram or Service Manual.
5. Please utilize separate "Common List for Service Parts" for Resistor Parts orders.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.
   It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

CAUTION:
1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.
3. Because parts number and parts unit supply in the Preliminary Service Manual (Basic Parts List) may be partially changed, please use this parts list for all future reference.

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

AVERTISSEMENT: ⚠ IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

## 1. RECOMMENDED SPARE PARTS

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare parts Items.

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1-1 | BHV1004A280A | UPPER DRUM BLK VS-5EG |
| 1-2 | BM324475 | MOTOR DDV5-1C |
| 1-3 | BM325491 | MOTOR FG DMF-4907A |
| 1-4 | BM325617 | MOTOR MXN-12AD08B |
| 1-5 | BM325314 | MOTOR VY220B10 |
| 1-6 | BR317908 | SUPPLY REEL TABLE BLK |
| 1-7 | BR327789 | TU REEL TABLE ASSY |
| 1-8 | BT705472 | ⚠ TRANS POWER KX590176 |
| 1-9 | BT705526 | ⚠ TRANS POWER VS-5-1B (EG) |
| 1-10 | BT705527 | ⚠ TRANS POWER VS-5-3B (EK) |
| 1-11 | BV330111 | ANT BOOSTER YBC1-001 |
| 1-12 | BV327845 | EJECTER ASSY |
| 1-13 | BVV1004A230A | LOADING BLK VS-5EG |
| 1-14 | BVV1004A300A | LOWER DRUM BLK VS-5EG |
| 1-15 | BV330110 | RF CONVERTER MBK3-253 (EK) |
| 1-16 | BV330109 | RF CONVERTER MDK3-253 (EG) |
| 1-17 | BVV1004A160A | ROLLER PINCH BLK VS-5EG |
| 1-18 | BV327815 | TU IDLER ASSY |
| 1-19 | ED780019 | D LED SEL1123W |
| 1-20 | ED706226 | D LED SE303A INFRARED |
| 1-21 | ED324943 | D LED SLP-134A RED |
| 1-22 | ED324943 | D LED SLP-134A RED |
| 1-23 | ED324823 | D LED SLP-234C GRN |
| 1-24 | ED330238 | D PHOTO PH302 |
| 1-25 | ED200469 | D SILICON H DS448 FA5 F10 |
| 1-26 | ED523427 | D SILICON H 1SS16 |
| 1-27 | ED557447 | D SILICON H 1S1588 |
| 1-28 | ED309437 | D SILICON H 1S1926-M |
| 1-29 | ED316143 | D SILICON H 1S2473HS F10 |
| 1-30 | ED705467 | D SILICON M4B51-14 |
| 1-31 | ED705468 | D SILICON T1B4B41 |
| 1-32 | ED200468 | D SILICON V DS448 VB3 |
| 1-33 | ED560913 | D SILICON V 1S2473VE |
| 1-34 | ED323979 | D SILICON W03B F12 150/1.0A |
| 1-35 | ED306109 | D SILICON W03B 100/1.0A |
| 1-36 | ED705479 | D SILICON 1SV70 |
| 1-37 | ED604541 | D SILICON 1S2076 |
| 1-38 | ED704267 | D SILICON 10E-1 |
| 1-39 | ED329058 | D ZENER H HZ5 C1 |
| 1-40 | ED330428 | D ZENER H WZ-090 |
| 1-41 | ED327059 | D ZENER H WZ-100 |
| 1-42 | ED570521 | D ZENER H XZ-049 |
| 1-43 | ED570521 | D ZENER H XZ-049 |
| 1-44 | ED705470 | D ZENER HZ11C1 |
| 1-45 | ED705469 | D ZENER HZ6C-2 |
| 1-46 | ED323892 | PHOTO SENSOR GP-411 |
| 1-47 | EE330106 | TV TUNER CBE1-002 (EK) |
| 1-48 | EE330292 | TV TUNER CDE1-011 (EG) |
| 1-49 | EF354295 | ⚠ FUSE T 1.6AT CEE |
| 1-50 | EF375660 | ⚠ FUSE T 1AT CEE |
| 1-51 | EF375660 | ⚠ FUSE T 1AT CEE |
| 1-52 | EF564491 | ⚠ FUSE T 4AT CEE |
| 1-53 | EF375647 | ⚠ FUSE T 500MAT CEE |
| 1-54 | EI322365 | DL EFD-EN645A11E |
| 1-55 | EI322394 | DL EFD-JN124A11A |
| 1-56 | EI328690 | IC AM1408N8 |
| 1-57 | EI634454 | IC AN262 |
| 1-58 | EI324204 | IC AN6310 |
| 1-59 | EI321076 | IC AN6320N |
| 1-60 | EI321604 | IC AN6341N |
| 1-61 | EI324203 | IC AN6342N |
| 1-62 | EI326044 | IC AN6350 |
| 1-63 | EI324151 | IC AN6360 |
| 1-64 | EI324160 | IC AN6362 |
| 1-65 | EI324182 | IC AN6371 |
| 1-66 | EI322309 | IC HA11703 |
| 1-67 | EI324107 | IC HA11718 |
| 1-68 | EI325992 | IC HD14024BP |
| 1-69 | EI328593 | IC HD14053BP |
| 1-70 | EI326159 | IC LM2903P |

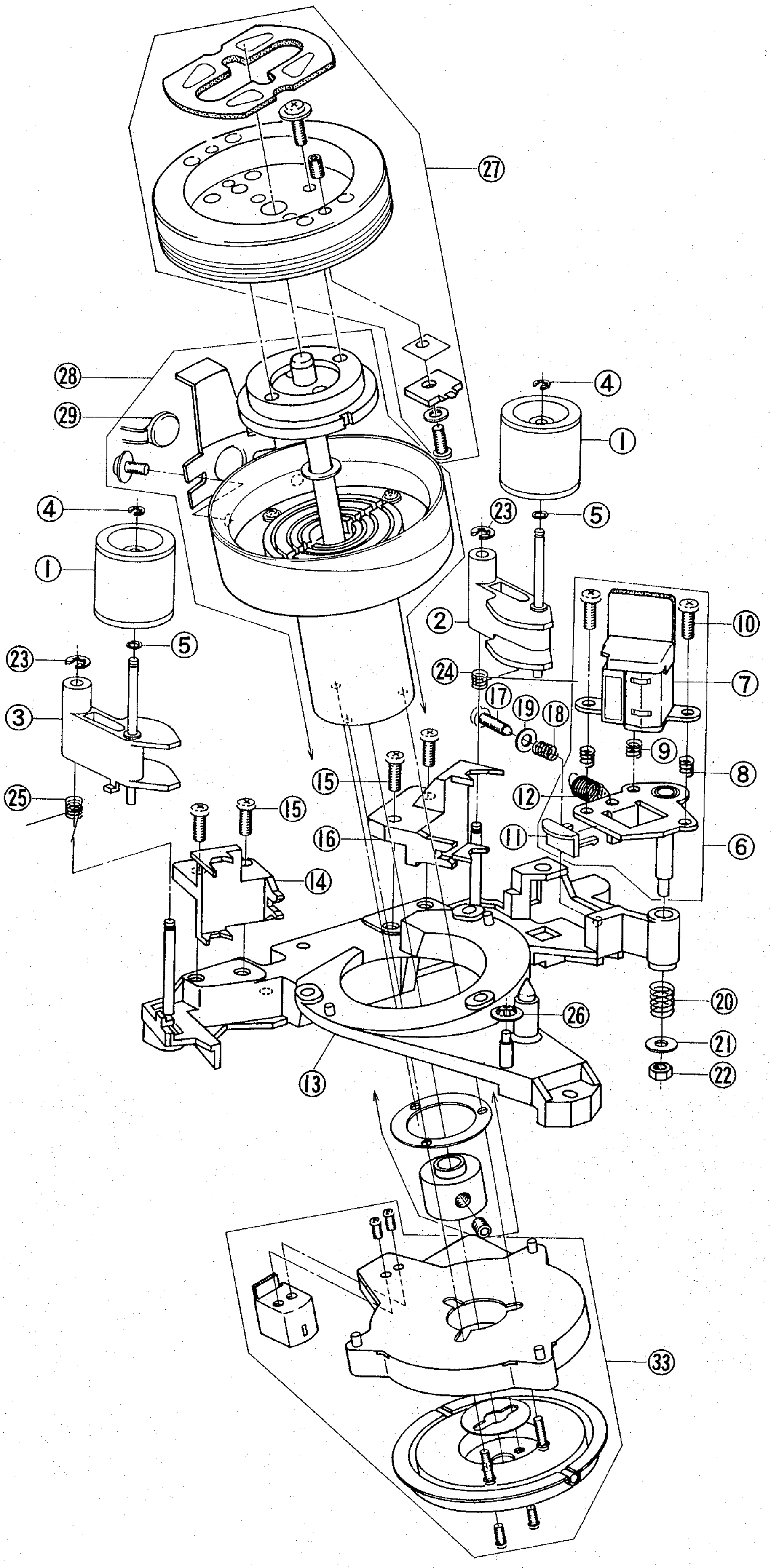
| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1-71 | EI326159 | IC LM2903P |
| 1-72 | EI324000 | IC MB8841 463M |
| 1-73 | EI323995 | IC MB8841 502J |
| 1-74 | EI330451 | IC MB8843 501M |
| 1-75 | EI324250 | IC MC14050BCP |
| 1-76 | EI304475 | IC MC14066BCP |
| 1-77 | EI304475 | IC MC14066BCP |
| 1-78 | EI304475 | IC MC14066BCP |
| 1-79 | EI324117 | IC MC14069UBCP |
| 1-80 | EI330392 | IC MC14070BCP |
| 1-81 | EI319496 | IC MC14539BCP |
| 1-82 | EI330392 | IC MC1458P |
| 1-83 | EI704201 | IC M5144P |
| 1-84 | EI330431 | IC TA7234 |
| 1-85 | EI705494 | IC TA7607P |
| 1-86 | EI313797 | IC TC4001BP |
| 1-87 | EI304657 | IC TC4011BP |
| 1-88 | EI324687 | IC TC4071BP |
| 1-89 | EI324255 | IC TL082CP |
| 1-90 | EI203040 | IC μA741CP |
| 1-91 | EI330226 | IC μPC1373H |
| 1-92 | EI308473 | IC μPC141C |
| 1-93 | EI301748 | IC μPC1458C |
| 1-94 | EI780020 | IC μPD1986C |
| 1-95 | EI328692 | IC μPD5101LC |
| 1-96 | EI780021 | OSC CE |
| 1-97 | EI327364 | OSC X'TAL HC-33/U 4.435571 MHZ |
| 1-98 | EI309878 | OSC X'TAL 4.433619 MHZ |
| 1-99 | EJ301513 | ⚠ SOCKET INLET S-I6453 E 2P |
| 1-100 | EJ319158 | JACK PLATE VS-5 B0002 |
| 1-101 | EJ330544 | PHONE J 3P HLJ0315-010 6.3 2T |
| 1-102 | EL330446 | PL SPL HOLDER LAMP |
| 1-103 | EM318923 | IND FL FIP12AM11 CHARACTER |
| 1-104 | EO330256 | OSC CE F85-006 4MHZ |
| 1-105 | EO330256 | OSC CE F85-006 4MHZ |
| 1-106 | EP318925 | RELAY POWER FBR221D006 2TR 6V |
| 1-107 | EP318925 | RELAY POWER FBR221D006 2TR 6V |
| 1-108 | EP330266 | RELAY POWER G2U-112P 1TR 12V |
| 1-109 | EP200175 | RELAY SIGNAL G2E 1TR 12V |
| 1-110 | EP327336 | RELAY SIGNAL G2V-2 2TR 12V |
| 1-111 | EP319333 | SOLENOID W/TAP 1037PLT 15V |
| 1-112 | ER705495 | FILTER CE F1024 38.9MHZ |
| 1-113 | ER705496 | FILTER CE F1025 39.5MHZ |
| 1-114 | ER705499 | FILTER CE SFE 5.5MHZ |
| 1-115 | ER705500 | FILTER CE SFE 6MHZ |
| 1-116 | ER328237 | FILTER CE SFE4.5MB 4.5MHZ |
| 1-117 | ER705501 | FILTER CE TPS 5.5MHZ |
| 1-118 | ER705502 | FILTER CE TPS 6MHZ |
| 1-119 | ER324339 | FILTER LC AP LCB-56 |
| 1-120 | ER324375 | FILTER LC BP LCB-57 4.43MHZ |
| 1-121 | ER324470 | FILTER LC BP LCB-60 4.43MHZ |
| 1-122 | ER325807 | FILTER LC BP LCB-61 5.06MHZ |
| 1-123 | ER324305 | FILTER LC HP LCB-53 |
| 1-124 | ER324258 | FILTER LC LP LCB-51 |
| 1-125 | ER324259 | FILTER LC LP LCB-52 |
| 1-126 | ER324309 | FILTER LC LP LCB-54 |
| 1-127 | ER324398 | FILTER LC LP LCB-58 |
| 1-128 | ER324469 | FILTER LC LP LCB-59 |
| 1-129 | ER330625 | FILTER LP LCB-62 |
| 1-130 | ER705460 | R CT RGC2T 2W R100G |
| 1-131 | ES705533 | ⚠ SW SEESAW SDE3S2023 |
| 1-132 | ES705534 | ⚠ SW TKR-22293 |
| 1-133 | ES318284 | SW LEVER SCL101R23A 1-01-02N |
| 1-134 | ES319124 | SW LEVER SCL101S 1-01-02N |
| 1-135 | ES319156 | SW MICRO SS-1-E-4 UC |
| 1-136 | ES319334 | SW SLIDE HSW0273-220 1-02-02 |
| 1-137 | ES319352 | SW SLIDE HSW0372-030 2-02-03 |
| 1-138 | ES326043 | SW SLIDE SSS322001 2-02-02N |

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1-139 | ES315362 | SW TACT AKC8S |
| 1-140 | ET330533 | POSISTER PTH61G04BD3R3N |
| 1-141 | ET330535 | TR FET 2SK246 Y,GR |
| 1-142 | ET318308 | TR PHOTO PN202S |
| 1-143 | ET318308 | TR PHOTO PN202S |
| 1-144 | ET325501 | TR 2SA1015 O,Y |
| 1-145 | ET200479 | TR 2SA1115 D,E,F |
| 1-146 | ET633677 | TR 2SA490 O,Y |
| 1-147 | ET322778 | TR 2SA608K-NP E,F,G |
| 1-148 | ET554657 | TR 2SA733A P,Q |
| 1-149 | ET554657 | TR 2SA733A P,Q |
| 1-150 | ET200925 | TR 2SA970 GR |
| 1-151 | ET207145 | TR 2SB560 D,E,F |
| 1-152 | ET330543 | TR 2SB621NC Q,R,S |
| 1-153 | ET330430 | TR 2SB632K D,E,F |
| 1-154 | ET322598 | TR 2SB632K E,F |
| 1-155 | ET200415 | TR 2SB641 Q,R,S |
| 1-156 | ET330216 | TR 2SB642 Q,R,S |
| 1-157 | ET330885 | TR 2SB857 C,D |
| 1-158 | ET301154 | TR 2SC1162 C,D |
| 1-159 | ET522270 | TR 2SC1210 D |
| 1-160 | ET517263 | TR 2SC1312R G,H |
| 1-161 | ET325899 | TR 2SC1983 R |
| 1-162 | ET322412 | TR 2SC2001 K,L,M |
| 1-163 | ET310833 | TR 2SC2274K E |
| 1-164 | ET200480 | TR 2SC2603 D,E,F |
| 1-165 | ET705480 | TR 2SC2717 |
| 1-166 | ET309334 | TR 2SC458 C,D |
| 1-167 | ET342707 | TR 2SC536NP E,F |
| 1-168 | ET621235 | TR 2SC536NP E,F,G |
| 1-169 | ET356962 | TR 2SC640 C |
| 1-170 | ET328553 | TR 2SC945A K,P |
| 1-171 | ET639437 | TR 2SC945L Q,P |
| 1-172 | ET398711 | TR 2SC945L Q,R |
| 1-173 | ET318604 | TR 2SD545NP E,F |
| 1-174 | ET200741 | TR 2SD571 K,L,M |
| 1-175 | ET330542 | TR 2SD592NC R;S |
| 1-176 | ET310148 | TR 2SD612K E,F |
| 1-177 | ET200412 | TR 2SD636 Q,R,S |
| 1-178 | ET303895 | TR 2SD667 C,D |
| 1-179 | ET303895 | TR 2SD667 C,D |
| 1-180 | EV319159 | VR ROTARY 16P10×1D B104 |
| 1-181 | EV705536 | VR TM8KV-2S B501 |
| 1-182 | HE325273 | HEAD E HV113201 V |
| 1-183 | HR325263 | HEAD COMBO HV225315 |
| 1-184 | MB326474 | BELT CAPSTAN |
| 1-185 | MB322303 | BELT DETECTION |
| 1-186 | MB780029 | BELT LOADING |
| 1-187 | MIB328611 | FLYWHEEL PART |
| 1-188 | MI327773 | IDLER ASSY |
| 1-189 | MI326478 | ROLLER IMPEDANCE |
| 1-190 | VTB319445 | LOADING LEADER (L) PART |
| 1-191 | VTB319446 | LOADING LEADER (R) PART |
| 1-192 | VT318087 | V BLOCK (L) |
| 1-193 | VT318088 | V BLOCK (R) |
| 1-194 | VT317947 | VERTICAL POLE PART (P) |

## 2. HEAD DRUM BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **ROLLER IMPEDANCE BLOCK** | |
| 2-1 | MI326478 | ROLLER IMPEDANCE |
| 2-2 | VTB327708 | LEVER RZ PART |
| 2-3 | VTB327729 | LEVER LZ PART |
| 2-4 | ZW356657 | RING E 150SUP CMT |
| 2-5 | ZW259334 | PW2.05×035×025PSL |
| | **AC. H BLOCK** | |
| 2-6 | BHV1004A260A | AC. H BLK VS-5EG |
| 2-7 | HR325263 | HEAD COMBO HV225315 |
| 2-8 | ZG330641 | SP PUSH ACH |
| 2-9 | ZG332459 | SP PUSH ACH (2) |
| 2-10 | ZS421806 | PAN30×08STL CMT |
| 2-11 | HZ327755 | GUIDE ACH |
| 2-12 | ZG327757 | SP PULL ACH SET |
| | **DRUM BASE BLOCK** | |
| 2-13 | BVB327700 | CHASSIS DRUM PART |
| 2-14 | VT318087 | V BLOCK (L) |
| 2-15 | ZS321298 | BID30×08STL CMT |
| 2-16 | VT318088 | V BLOCK (R) |
| 2-17 | ZS305246 | ADJUST SCREW (B) |
| 2-18 | ZG330868 | SP PUSH TRACKING |
| 2-19 | ZW306464 | PW31×070×050STL CMT |
| 2-20 | ZG331178 | SP PUSH PRESS ACH |
| 2-21 | ZW550642 | PW31×080×050STL CMT |
| 2-22 | ZW516993 | N30STL CMT 1 |
| 2-23 | ZW357164 | RING E230SUP CMT |
| 2-24 | ZG327736 | SP TORSION RZ |
| 2-25 | ZG327740 | SP TORSION LZ |
| 2-26 | ZW340648 | RING CS190STL PKR |
| | **UPPER DRUM BLOCK** | |
| 2-27 | BHV1004A280A | UPPER DRUM BLK VS-5EG |
| | **LOWER DRUM BLOCK** | |
| 2-28 | BVV1004A300A | LOWER DRUM BLK VS-5EG |
| 2-29 | ET324474 | POSISTER PTH499D09BF200N030 |
| | **HEAD DRUM BLOCK** | |
| 2-30x | ZS421806 | PAN30×08STL CMT |
| 2-31x | ZW328150 | PW30×060×013PSL |
| 2-32x | ZS609491 | PAN30×10STL CMT PW080 |
| 2-33 | BM324475 | MOTOR DDV5-1C |

## HEAD DRUM BLOCK



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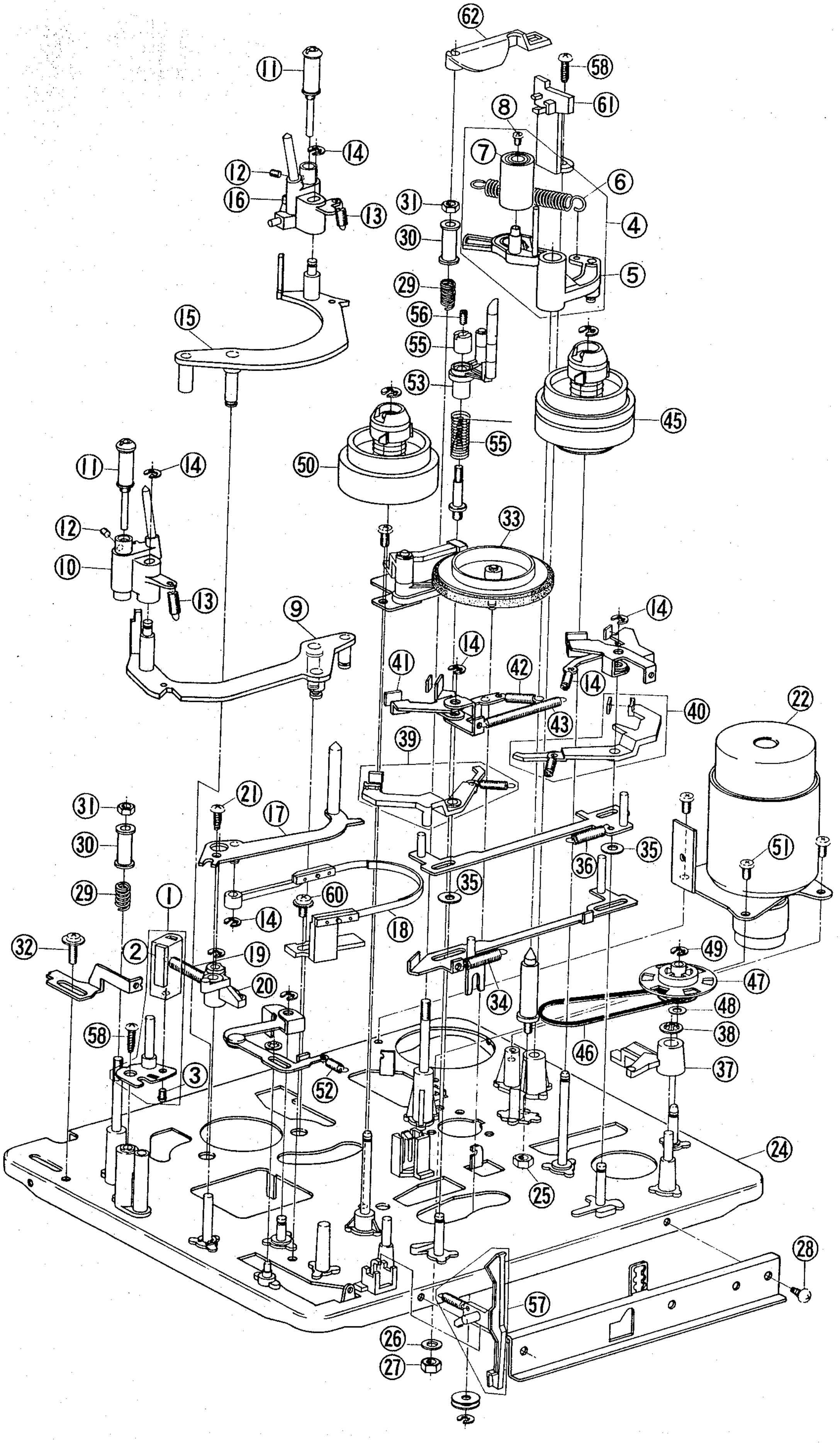
## MECHA FRAME BLOCK (1)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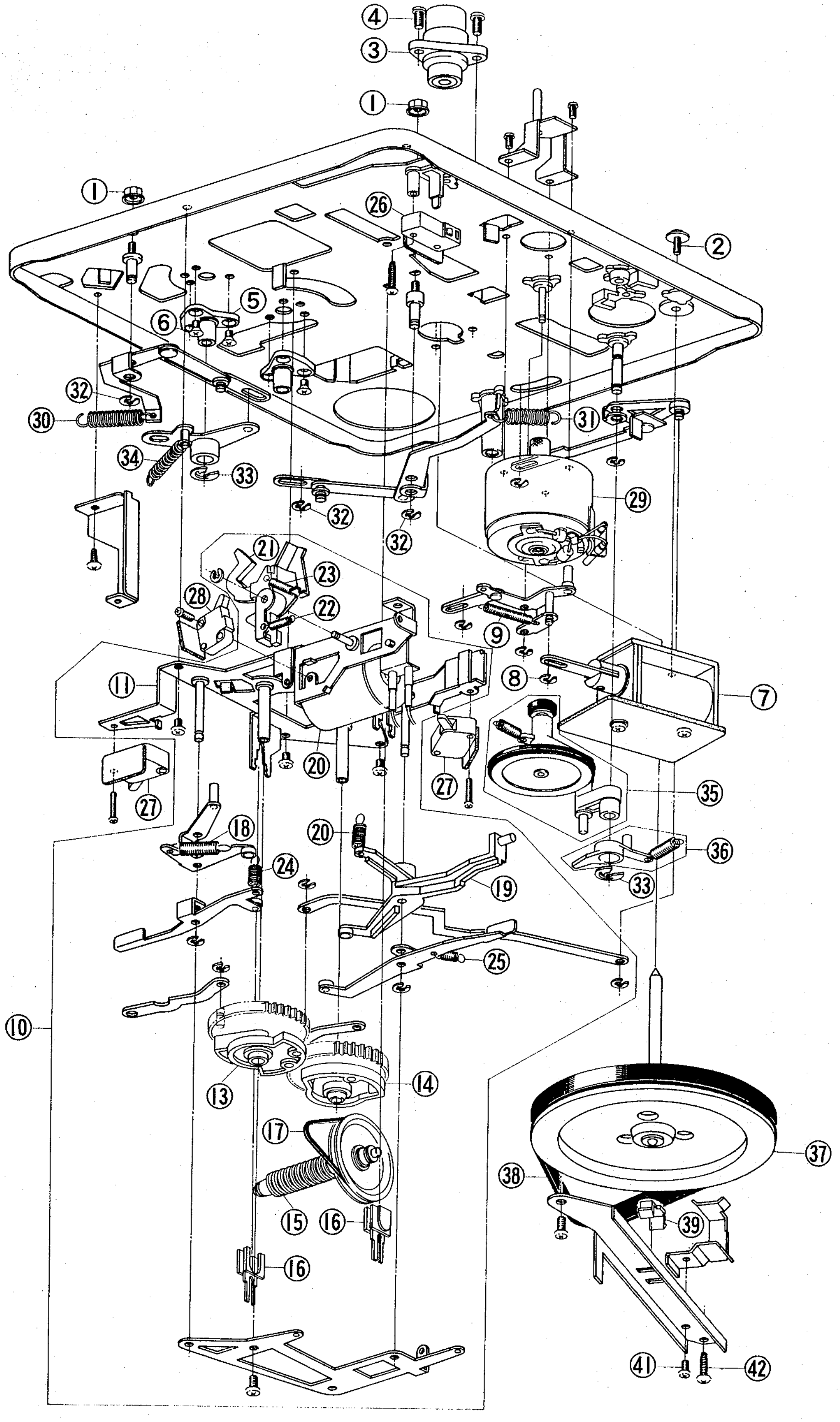
## 3. MECHA FRAME BLOCK (1)

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **HOLDER ERASE HEAD BLOCK** | |
| 3-1 | BVV1004A070A | HOLDER EH BLK VS-5EG |
| 3-2 | HE325273 | HEAD E HV113201 V |
| 3-3 | ZS477876 | PAN20×03STL CMT |
| | **LEVER PINCH ROLLER BLOCK** | |
| 3-4 | BVV1004A150A | LEVER PINCH ROLLER BLK VS-5EG |
| 3-5 | MLB326296 | LEVER PINCH ROLLER PART |
| 3-6 | ZG330058 | SP T2-6.3/0.8-45 T2-202 |
| 3-7 | BVV1004A160A | ROLLER PINCH BLK VS-5EG |
| 3-8 | ZS477876 | PAN20×03STL CMT |
| | **LEVER LOADING (L) BLOCK** | |
| 3-9 | VTB326329 | LEVER LOADING (L) PART |
| 3-10 | VTB319445 | LOADING LEADER (L) PART |
| 3-11 | VT317947 | VERTICAL POLE PART (P) |
| 3-12 | ZS318212 | 6SET23×030SCM PKR WP |
| 3-13 | ZG318043 | LEADER SPRING |
| 3-14 | ZW357164 | RING E230SUP CMT |
| | **LEVER LOADING (R) BLOCK** | |
| 3-15 | BVB326347 | LEVER LOADING (R) PART |
| 3-16 | VTB319446 | LOADING LEADER (R) PART |
| | **TENSION ARM BLOCK** | |
| 3-17 | VTB326468 | LEVER TENSION PART |
| 3-18 | VT328134 | TENSION BAND ASSY |
| 3-19 | ZG331128 | SP T2-4.0/0.4-45 T2-120 |
| 3-20 | VT326470 | HOLDER TENSION LEVER |
| 3-21 | ZS310984 | PT BR30×08STL CMT |
| | **CAPSTAN MOTOR BLOCK** | |
| 3-22 | BM325491 | MOTOR FG DMF-4907A |
| 3-23x | ZS558101 | PAN30×06STL CMT TW |
| | **MECHA FRAME BLOCK** | |
| 3-24 | BVV1004A015A | MECHA FRAME BLK VS-5EG |
| 3-25 | ZW609434 | N FRANGE 30STL CMT |
| 3-26 | ZW306464 | PW31×070×050STL CMT |
| 3-27 | ZW516993 | N30STL CMT 1 |
| 3-28 | ZS325495 | T2BR30×06STL CMT |
| 3-29 | ZG328225 | SP C-3.5/0.8-10.0G C-102G |
| 3-30 | MH321724 | GUIDE TAPE |
| 3-31 | ZW516993 | N30STL CMT 1 |
| 3-32 | ZS328607 | TRIPLE SCREW PAN30×05 |
| 3-33 | MI327773 | IDLER ASSY |
| 3-34 | ZG313001 | SP T1-4.0/0.4-22.4 T1-114 |
| 3-35 | ZW259503 | PW31×080×050NYL |
| 3-36 | ZG332463 | SP T2-3.2/0.29-20 T2-064 |
| 3-37 | ML330640 | LEVER BRAKE RELEASER |
| 3-38 | ZW653163 | RING CS280STL PKR |
| 3-39 | MLV1004A090A | LEVER FF BRAKE BLK VS-5EG |
| 3-40 | MLV1004A100A | LEVER REW BRAKE BLK VS-5EG |
| 3-41 | VT322159 | SHEET BRAKE (A) |
| 3-42 | ZG318204 | SP T2-3.2/0.29-16 T2-062 |
| 3-43 | ZG312955 | SP T1-3.2/0.29-40.0 T1-070 |
| 3-44 | ZG318228 | SP T2-3.2/0.29-14 T2-061 |
| 3-45 | BR327789 | TU REEL TABLE ASSY |
| 3-46 | MB322303 | BELT DETECTION |
| 3-47 | MI322304 | WHEEL DETECTION |
| 3-48 | ZW324417 | PW31×060×050PSL |
| 3-49 | ZW357164 | RING E230SUP CMT |
| 3-50 | BR317908 | SUPPLY REEL TABLE BLK |
| 3-51 | ZS325495 | T2BR30×06STL CMT |
| 3-52 | ZG318228 | SP T2-3.2/0.29-14 T2-061 |
| 3-53 | BVB326220 | LEVER REVIEW PART |
| 3-54 | ZG326247 | SP TORSION REVIEW |
| 3-55 | ZS326246 | NUT ADJUST |
| 3-56 | ZS328608 | 6SET26×030SCM PKR FP |
| 3-57 | BVV1004A170A | LEVER REC SAFETY BLK VS-5EG |
| 3-58 | ZS323993 | PT BR30×10STL CMT |
| 3-59x | ZW269954 | PW31×070×025PSL |
| 3-60 | ZS200614 | TRIPLE SCREW PAN30×06 |
| 3-61 | VT326471 | HOLDER OPENER |
| 3-62 | VT326477 | GUIDE CAP |

## MECHA FRAME BLOCK (2)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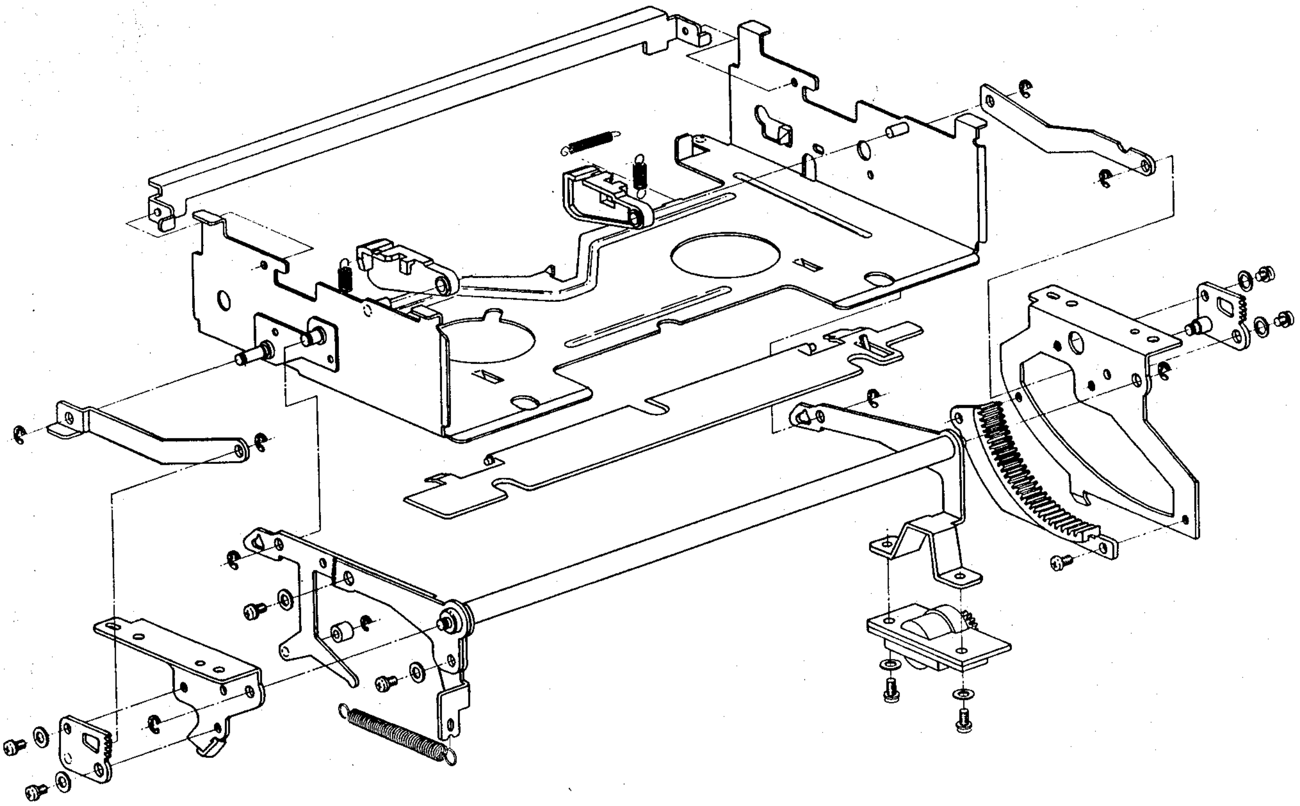
## 4. MECHA FRAME BLOCK (2)

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 4-1 | ZW609434 | N FRANGE 30STL CMT |
| 4-2 | ZS328607 | TRIPLE SCREW PAN30x05 |
| 4-3 | MZB321701 | HOLDER CAPSTAN PART |
| 4-4 | ZS379350 | PAN30x06STL CMT |
| 4-5 | MV322302 | METAL LOADING |
| 4-6 | ZS444330 | CTS30x04STL CMT |
|  | **PLUNGER BLOCK** |  |
| 4-7 | EP319333 | SOLENOID W/TAP 1037PLT 15V |
| 4-8 | ZW357164 | RING E230SUP CMT |
| 4-9 | ZG328661 | SP T2-3.2/0.29-25 T2-066 |
|  | **LOADING BLOCK** |  |
| 4-10 | BVV1004A230A | LOADING BLK VS-5EG |
| 4-11 | BM780041 | LOADING MOTOR SUB ASSY |
| 4-12 | BM325617 | MOTOR MXN-12AD08B |
| 4-13 | VT780025 | LOADING GEAR A ASSY |
| 4-14 | VT780026 | LOADING GEAR B SUB ASSY |
| 4-15 | VT780027 | LOADING WARM ASSY |
| 4-16 | VT780028 | HOLDER GEAR SHAFT |
| 4-17 | MB780029 | BELT LOADING |
| 4-18 | ZG780032 | SP TENSION LEVER RETURN |
| 4-19 | BL780033 | BRAKE LEVER ASSY |
| 4-20 | ZG780035 | SP BRAKE LEVER |
| 4-21 | ML780036 | LOCK ARM (A) |
| 4-22 | ZG780037 | SP LOCK RETURN |
| 4-23 | ZG780038 | SP LOCK HOLD |
| 4-24 | ZG780039 | SP SW A |
| 4-25 | ZG780040 | SP SW B |
| 4-26 | ES319156 | SW MICRO SS-1-E-4 UC (SW904) |
| 4-27 | ES318284 | SW LEVER SCL101R23A 1-01-02N (SW905, 906) |
| 4-28 | ES319124 | SW LEVER SCL101S 1-01-02N (SW907) |
| 4-29 | BM325314 | MOTOR VY220B10 |
| 4-30 | ZG328610 | SP T2-6.3/0.8-28 T2-198 |
| 4-31 | ZG313085 | SP T1-6.3/0.8-25.0 T1-197 |
| 4-32 | ZW270101 | RING E300SUP CMT |
| 4-33 | ZW290283 | RING U 285SUP CMT |
| 4-34 | ZG321769 | SP T2-5.0/0.55-35.5 T2-161 |
| 4-35 | BV327815 | TU IDLER ASSY |
| 4-36 | BVV1004A220A | LEVER TU IDLER KICK BLK VS-5EG |
| 4-37 | MIB328611 | FLYWHEEL PART |
| 4-38 | MB326474 | BELT CAPSTAN |
| 4-39 | VT326476 | HOLDER PIVOT |
| 4-40x | ZW259738 | PW41x070x025PSL |
| 4-41 | ZS379350 | PAN30x06STL CMT |
| 4-42 | ZS323993 | PT BR30x10STL CMT |

# EJECTER BLOCK



## 5. EJECTER BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 5-1 | BV327845 | EJECTER ASSY |

# 6. VIDEO P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 6-1 | BAV1004A460A | PC VIDEO (PAL) BLK VS-5EG |
| 6-2 | BAV1004A460B | PC VIDEO (PAL) BLK VS-5EK |
| 6-IC1 | EI324204 | IC AN6310 |
| 6-IC2 | EI321076 | IC AN6320N |
| 6-IC3 | EI324107 | IC HA11718 |
| 6-IC4 | EI322309 | IC HA11703 |
| 6-IC5 | EI330393 | IC MC1458P |
| 6-IC6 | EI324117 | IC MC14069UBCP |
| 6-IC7 | EI324151 | IC AN6360 |
| 6-IC8 | EI324160 | IC AN6362 |
| 6-IC9 | EI324182 | IC AN6371 |
| 6-IC10 | EI324203 | IC AN6342N |
| 6-IC11 | EI203040 | IC μA741CP |
| 6-TR1to3 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR4 | ET200480 | TR 2SC2603 D,E,F |
| 6-TR5 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR6 | ET322778 | TR 2SA608K-NP E,F,G |
| 6-TR7 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR8 | ET330543 | TR 2SB621NC Q,R,S |
| 6-TR9 | ET200480 | TR 2SC2603 D,E,F |
| 6-TR10to12 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR13to16 | ET200480 | TR 2SC2603 D,E,F |
| 6-TR17 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR18 | ET200479 | TR 2SA1115 D,E,F |
| 6-TR19to24 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR25 | ET310833 | TR 2SC2274K E |
| 6-TR26to29 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR30to37 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR38 | ET342707 | TR 2SC536NP E,F |
| 6-TR39,40 | ET621235 | TR 2SC536NP E,F,G (EG) |
| 6-TR41 | ET322778 | TR 2SA608K-NP E,F,G |
| 6-TR42 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR43 | ET322778 | TR 2SA608K-NP E,F,G |
| 6-TR44 | ET621235 | TR 2SC536NP E,F,G |
| 6-TR46 | ET330543 | TR 2SB621NC Q,R,S |
| 6-TR47to50 | ET621235 | TR 2SC536NP E,F,G |
| 6-D1,2 | ED523427 | D SILICON H 1SS16 |
| 6-D3 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D5to9 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D10,11 | ED309437 | D SILICON H 1S1926-M |
| 6-D14to16 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D17 | ED316143 | D SILICON H 1S2473HS F10 |
| 6-D18 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D19 | ED200469 | D SILICON H DS448 FA5 F10(FG) |
| 6-D20,21 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D22to24 | ED200469 | D SILICON H DS448 FA5 F10(EG) |
| 6-D25to28 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D31to33 | ED200469 | D SILICON H DS448 FA5 F10 |
| 6-D34 | ED200468 | D SILICON V DS448 VB3 |
| 6-D35 | ED560913 | D SILICON V 1S2473VE |
| 6-VC1 | EC257354 | C S-FIX H ECV-1ZW20×44 2.5-20 |
| 6-VC2,3 | EC318315 | C S-FIX H ECV-1ZW50×44 5.0-50 |
| 6-VC21 | EC325060 | C S-FIX V ECV-1ZW10×40 |
| 6-VC22 | EC318375 | C S-FIX H ECV-1ZW10×44 2.0-10 |
| 6-FR1 | ER200595 | ⚠ R FUSE ERD2FC F10 1/4W 5R6J |
| 6-VR1,2 | EV315540 | R S-FIX H D8 3P 502 |
| 6-VR3,4 | EV330365 | R S-FIX V H1052A 3P 0.15W 472 |
| 6-VR5 | EV330366 | R S-FIX V H1052A 3P 0.15W 102 |
| 6-VR6,7 | EV361800 | R S-FIX H SR19R 3P 0.15W 471 |
| 6-VR8 | EV323885 | R S-FIX H D8 3P 301 |
| 6-VR9 | EV315753 | R S-FIX H D8 3P 203 |
| 6-VR21 | EV330366 | R S-FIX V H1052A 3P 0.15W 102 |
| 6-VR22 | EV322411 | R S-FIX H D8 3P 202 |
| 6-VR23 | EV319381 | R S-FIX H D8 3P 501 |
| 6-VR24 | EV316442 | R S-FIX H D8 3P 102 |
| 6-VR25 | EV315540 | R S-FIX H D8 3P 502 |
| 6-VL21,22 | EO322349 | COIL VARI 1 T-4-A 8.2μH |
| 6-VL23 | EO325093 | COIL VARI 1 T-6 8.2MH (EG) |
| 6-L1 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L2 | EO330240 | COIL FIX 1 EL0606SKI 47μH K |
| 6-L3 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L4 | EO330242 | COIL FIX 1 EL0606SKI 39μH K |
| 6-L5,6 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L7,8 | EO330244 | COIL FIX 1 EL0606SKI 2.2μH K |

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 6-L9 | EO330245 | COIL FIX 1 EL0606SKI 10μH K |
| 6-L10 | EO330246 | COIL FIX 1 EL0606SKI 56μH K |
| 6-L11 | EO330247 | COIL FIX 1 EL0606SKI 27μH K |
| 6-L12 | EO330250 | COIL FIX 1 EL0606SKI 22μH K |
| 6-L13 | EO330248 | COIL FIX 1 EL0606SKI 33μH K |
| 6-L14 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L15 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L17 | EO330248 | COIL FIX 1 EL0606SKI 33μH K |
| 6-L18,19 | EO330249 | COIL FIX 1 EL0606SKI 8.2μH K |
| 6-L21 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L22 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L23 | EO330250 | COIL FIX 1 EL0606SKI 22μH K |
| 6-L24 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L25,26 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L27 | EO330251 | COIL FIX 1 EL0606SKI 470μH K |
| 6-L28 | EO322315 | COIL FIX 1 EL0810SKI 820μH J |
| 6-L29 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L30 | EO318383 | COIL FIX 1 FL07H 6.8MH J |
| 6-L31 | EO330240 | COIL FIX 1 EL0606SKI 47μH K |
| 6-L32 | EO330248 | COIL FIX 1 EL0606SKI 33μH K |
| 6-L33 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L35 | EO379923 | COIL FIX 1 FL07H 8.2MH (EG) |
| 6-L36,37 | EO318381 | COIL FIX 1 LAL04 220μH K |
| 6-L38 | EO330252 | COIL FIX 1 EL0606SKI 100μH K |
| 6-L39 | EO330246 | COIL FIX 1 EL0606SKI 56μH K |
| 6-L40 | EO330241 | COIL FIX 1 EL0606SKI 220μH K |
| 6-L41 | EO330240 | COIL FIX 1 EL0606SKI 47μH K |
| 6-L42 | EO332315 | COIL FIX 1 LAL04 120μH J |
| 6-FL1 | ER324258 | FILTER LC LP LCB-51 |
| 6-FL2 | ER324259 | FILTER LC LP LCB-52 |
| 6-FL3 | ER324305 | FILTER LC HP LCB-53 |
| 6-FL4 | ER324309 | FILTER LC LP LCB-54 |
| 6-FL5 | ER330625 | FILTER LP LCB-62 |
| 6-FL6 | ER324339 | FILTER LC AP LCB-56 |
| 6-FL7 | ER324375 | FILTER LC BP LCB-57 4.43MHZ |
| 6-FL8 | ER324398 | FILTER LC LP LCB-58 |
| 6-FL9 | ER324469 | FILTER LC LP LCB-59 |
| 6-FL10 | ER324470 | FILTER LC BP LCB-60 4.43MHZ |
| 6-FL11 | ER325807 | FILTER LC BP LCB-61 5.06MHZ |
| 6-FL12 | ER328237 | FILTER CE SFE4.5MB 4.5MHZ |
| 6-X1 | EI327364 | OSC X'TAL HC-33/U 4.435571MHZ |
| 6-X2 | EI309878 | OSC X'TAL 4.433619MHZ |
| 6-DL1 | EI322365 | DL EFD-EN645A11E |
| 6-DL2 | EI322394 | DL EFD-JN124A11A |
| 6-C3 | EC307793 | C EC V F05 NP SM 220M 10DC |
| 6-C16 | EC332052 | C EC V F05 NP SM 4R7M 35DC |
| 6-C171 | EC200949 | C EC V F05 NP SM 470M 10DC |
| 6-3 | TP326491 | HINGE PC ROD |

# 7. SERVO P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 7-1 | BAV1004A450A | PC SERVO BLK VS-5EG (INCLUDING SERVO PCB & SYS. CON. PCB) |

## SERVO P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 7-IC1 | EI326044 | IC AN6350 |
| 7-IC2 | EI304475 | IC MC14066BCP |
| 7-IC3 | EI313797 | IC TC4001BP |
| 7-IC4 | EI321604 | IC AN6341N |
| 7-IC5 | EI330393 | IC MC1458P |
| 7-IC6 | EI304475 | IC MC14066BCP |
| 7-IC7 | EI325992 | IC HD14024BP |
| 7-IC8 | EI328593 | IC HD14053BP |
| 7-TR1,2 | ET309334 | TR 2SC458 C,D |
| 7-TR3 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR4,5 | ET309334 | TR 2SC458 C,D |
| 7-TR6,7 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR8to11 | ET309334 | TR 2SC458 C,D |
| 7-TR12,13 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR14 | ET309334 | TR 2SC458 C,D |
| 7-TR15 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR16 | ET309334 | TR 2SC458 C,D |
| 7-TR17 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR18 | ET309334 | TR 2SC458 C,D |
| 7-D1 | ED200469 | D SILICON H DS448 FA5 F10 |
| 7-D2to13 | ED557447 | D SILICON H 1S1588 |
| 7-D14,15 | ED200469 | D SILICON H DS448 FA5 F10 |
| 7-D16to19 | ED557447 | D SILICON H 1S1588 |
| 7-D20,21 | ED200469 | D SILICON H DS448 FA5 F10 |
| 7-SW1 | ES326043 | SW SLIDE SSS322001 2-02-02N |
| 7-VR1 | EV325993 | R S-FIX V H1052A 3P 0.15W 473 |
| 7-VR2 | EV323880 | R S-FIX V CR29R 3P 0.50W 683 |
| 7-VR3to5 | EV323881 | R S-FIX V CR29R 3P 0.50W 473 |
| 7-VR6 | EV323880 | R S-FIX V CR29R 3P 0.50W 683 |
| 7-VR7 | EV323881 | R S-FIX V CR29R 3P 0.50W 473 |
| 7-VR8 | EV330258 | R S-FIX V H1052A 3P 0.15W 683 |
| 7-VR9,10 | EV325994 | R S-FIX V H1052A 3P 0.15W 103 |
| 7-VR11 | EV325995 | R S-FIX V H1052A 3P 0.15W 333 |
| 7-VR12 | EV200466 | R S-FIX H EVN38 3P 302 |
| 7-L1 | EO357287 | COIL FIX 1 FL05H 100μH K |
| 7-R7,8 | ER330272 | R MF H F10 1/4W 3302F |
| 7-R13 | ER318335 | R MF H F10 1/4W 8202F |
| 7-R17 | ER317658 | R MF H F10 1/4W 1003F |
| 7-R18 | ER314630 | R MF H 1/4W 1003F |
| 7-R19 | ER311773 | R MF H 1/4W 3301F |
| 7-R20 | ER323374 | R MF H F10 1/4W 1302F |
| 7-R22 | ER330273 | R MF H F10 1/4W 1693F |
| 7-R23 | ER330274 | R MF H F10 1/4W 2003F |
| 7-R24 | ER318323 | R MF H F10 1/4W 1803F |
| 7-R25 | ER314597 | R MF H 1/4W 1302F |
| 7-R28 | ER311773 | R MF H 1/4W 3301F |

## SYS. CON. P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 7-IC301 | EI323995 | IC MB8841 502J |
| 7-IC302,303 | EI319496 | IC MC14539BCP |
| 7-IC304 | EI326159 | IC LM2903P |
| 7-IC305 | EI330392 | IC MC14070BCP |
| 7-IC306 | EI324687 | IC TC4071BP |
| 7-IC307 | EI324000 | IC MB8841 463M |
| 7-IC308 | EI328692 | IC μPD5101LC |
| 7-IC309 | EI328690 | IC AM1408N8 |
| 7-IC310 | EI324255 | IC TL082CP |
| 7-IC311 | EI304475 | IC MC14066BCP |
| 7-IC312 | EI330393 | IC MC1458P |
| 7-IC313 | EI326159 | IC LM2903P |
| 7-IC314,315 | EI304657 | IC TC4011BP |
| 7-TR301 | ET207145 | ⚠ TR 2SB560 D,E,F |
| 7-TR302,303 | ET322778 | ⚠ TR 2SA608K-NP E,F,G |
| 7-TR304,305 | ET309334 | TR 2SC458 C,D |
| 7-TR306 | ET207145 | ⚠ TR 2SB560 D,E,F |
| 7-TR307to310 | ET322778 | TR 2SA608K-NP E,F,G |
| 7-TR311to313 | ET309334 | TR 2SC458 C,D |
| 7-D301 | ED323979 | D SILICON W03B F12 150/1.0A |
| 7-D302to305 | ED557447 | D SILICON H 1S1588 |
| 7-D306 | ED306109 | ⚠ D SILICON W03B 100/1.0A |
| 7-D307 | ED570521 | D ZENER H XZ-049 |
| 7-D308,309 | ED557447 | D SILICON H 1S1588 |
| 7-D310,311 | ED200468 | D SILICON V DS448 VB3 |
| 7-D312 | ED557447 | D SILICON H 1S1588 |
| 7-D313 | ED200469 | D SILICON H DS448 FA5 F10 |
| 7-D314 | ED557447 | D SILICON H 1S1588 |
| 7-D315 | ED306109 | ⚠ D SILICON W03B 100/1.0A |
| 7-D316 | ED557447 | D SILICON H 1S1588 |
| 7-RL301 | EP330266 | RELAY POWER G2U-112P 1TR 12V |
| 7-X301 | EO330256 | OSC CE F85-006 4MHZ |
| 7-BT301 | AX325991 | BATTERY P-2M11 |
| 7-L301,302 | EO575651 | COIL FIX 1 FL07H·100μH K |
| 7-CR301 | ER330314 | COMP CR EXRP101K433S |
| 7-CR302 | ER330313 | COMP CR EXRP150K272S |
| 7-CR303 | ER330267 | COMP R 01-0320 |
| 7-R345 | ER323875 | R MF H F10 1/4W 3900F |
| 7-R346 | ER317684 | R MF H F10 1/4W 9100F |
| 7-R352 | ER311774 | R MF H 1/4W 9102F |
| 7-R357 | ER314632 | R MF H 1/4W 3902F |
| 7-2 | VT325900 | BUZZER PKM11-4A0 |

## 8. AUDIO P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 8-1 | BAV1004A040A | PC AUDIO BLK VS-5EG |
| 8-IC1 | EI634454 | IC AN262 |
| 8-TR1,2 | ET517263 | TR 2SC1312R G,H |
| 8-TR3to7 | ET309334 | TR 2SC458 C,D |
| 8-TR8 | ET322778 | TR 2SA608K-NP E,F,G |
| 8-TR9 | ET322412 | TR 2SC2001 K,L,M |
| 8-TR10 | ET330543 | TR 2SB621NC Q,R,S |
| 8-TR11 | ET322778 | TR 2SA608K-NP E,F,G |
| 8-TR12 | ET200480 | ⚠ TR 2SC2603 D,E,F |
| 8-TR13 | ET309334 | TR 2SC458 C,D |
| 8-TR14 | ET200479 | ⚠ TR 2SA1115 D,E,F |
| 8-TR15,16 | ET309334 | TR 2SC458 C,D |
| 8-D2 | ED200468 | D SILICON V DS448 VB3 |
| 8-D4to14 | ED200468 | D SILICON V DS448 VB3 |
| 8-VR1 | EV315412 | R S-FIX H D8 3P 502 |
| 8-VR2 | EV315414 | R S-FIX H D8 3P 203 |
| 8-VR3 | EV315416 | R S-FIX H D8 3P 103 |
| 8-VR4 | EV321637 | R S-FIX H D8 3P 104 |
| 8-RL1 | EP327336 | RELAY SIGNAL G2V-2 2TR 12V |
| 8-RL2 | EP200175 | RELAY SIGNAL G2E 1TR 12V |
| 8-L2,3 | EO357287 | COIL FIX 1 FL05H 100μH K |
| 8-L4 | EO369178 | COIL FIX 1 FL07H 1.5MH J |
| 8-L5 | EO318383 | COIL FIX 1 FL07H 6.8MH J |
| 8-L6 | EO419602 | COIL FIX 1 FL05H 47μH K |
| 8-L7 | EO243977 | COIL FIX 1 FL07H 1MH J |
| 8-L8 | EO357287 | COIL FIX 1 FL05H 100μH K |
| 8-L10 | EO323938 | COIL OSC 1 32-1296-12 70KHZ |
| 8-L11 | EO318882 | COIL FIX 2 47-0079-01 950μH |
| 8-FR1 | ER318647 | R FUSE ERD2FC F10 1/4W 4R7J |
| 8-C36 | EC200592 | C STY V T05 CQT92 331J 125DC |
| 8-C37 | EC330441 | C PP V F10 PFH 153J 400DC |
| 8-C50 | EC330442 | C PP V F10 PFH 123J 400DC |
| 8-2 | ZW698940 | RV NYL40×060 BL |

## 9. DISPLAY P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 9-1 | BAV1004A060A | PC DISPLAY BLK VS-5EG |
| 9-IC1 | EI330226 | IC μPC1373H |
| 9-IC3 | EI324250 | IC MC14050BCP |
| 9-IC4 | EI330451 | IC MB8843 501M |
| 9-TR2 | ET330535 | TR FET 2SK246 Y, GR |
| 9-TR3 | ET322778 | TR 2SA608K-NP E,F,G |
| 9-TR4 | ET309334 | TR 2SC458 C,D |
| 9-TR5to24 | ET330216 | TR 2SB642 Q,R,S |
| 9-TR25,26 | ET207145 | TR 2SB560 D,E,F |
| 9-TR27 | ET200412 | TR 2SD636 Q,R,S |
| 9-D6 | ED330238 | D PHOTO PH302 |
| 9-D7to40 | ED200469 | D SILICON H DS448 FA5 F10 |
| 9-D41to44 | ED324823 | D LED SLP-234C GRN |
| 9-D45,46 | ED324943 | D LED SLP-134A RED |
| 9-D47,48 | ED324823 | D LED SLP-234C GRN |
| 9-D49 | ED324943 | D LED SLP-134A RED |
| 9-SW1to26 | ES315362 | SW TACT AKC8S |
| 9-IN1 | EM318923 | IND FL FIP12AM11 CHARACTER |
| 9-L1 | EO330326 | COIL VARI 1 7PA 5MH |
| 9-L2 | EO318379 | COIL FIX 1 LAL04 100μH K |
| 9-X1 | EO330256 | OSC CE F85-006 4MHZ |
| 9-2 | VT327211 | SHIELD CASE REMOCON (A) |
| 9-3 | VT327212 | FILTER |
| 9-4 | VT326856 | HOLDER LED (A) |
| 9-5 | VT326870 | HOLDER LED (B) |
| 9-6 | VT326873 | CAP LED |
| 9-7 | VT326610 | HOLDER DISPLAY (A) |
| 9-8 | VT326829 | HOLDER DISPLAY (B) |
| 9-9 | VT326787 | HOLDER PHOTO DIODE |
| 9-10 | ZW698940 | RV NYL40×060 BL |

## 10. DRIVE P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 10-1 | BVA1004A350A | PC DRIVE BLK VS-5EG |
| 10-TR2 | ET322598 | ⚠ TR 2SB632K E,F |
| 10-TR3 | ET200412 | TR 2SD636 Q,R,S |
| 10-TR4 | ET330542 | TR 2SD592NC R,S |
| 10-TR5 | ET310148 | TR 2SD612K E,F |
| 10-TR6 | ET200412 | TR 2SD636 Q,R,S |
| 10-TR7 | ET318308 | TR PHOTO PN202S |
| 10-TR13 | ET322598 | TR 2SB632K E,F |
| 10-TR14 | ET200412 | TR 2SD636 Q,R,S |
| 10-TR15 | ET322598 | TR 2SB632K E,F |
| 10-TR16 | ET200415 | TR 2SB641 Q,R,S |
| 10-TR17,18 | ET330543 | TR 2SB621NC Q,R,S |
| 10-TR19 | ET200415 | TR 2SB641 Q,R,S |
| 10-TR20 | ET310148 | TR 2SD612K E,F |
| 10-TR21 | ET200415 | ⚠ TR 2SB641 Q,R,S |
| 10-TR22 | ET200412 | TR 2SD636 Q,R,S |
| 10-TR23 | ET330542 | TR 2SD592NC R,S |
| 10-TR25 | ET309334 | TR 2SC458 C,D |
| 10-D1,2 | ED323979 | D SILICON W03B F12 150/1.0A |
| 10-D3to5 | ED200469 | D SILICON H DS448 FA5 F10 |
| 10-D6 | ED570521 | D ZENER H XZ-049 |
| 10-D7 | ED327059 | D ZENER H WZ-100 |
| 10-D8to15 | ED200469 | D SILICON H DS448 FA5 F10 |
| 10-D16 | ED330428 | D ZENER H WZ-090 |
| 10-D17 | ED327059 | D ZENER H WZ-100 |
| 10-RL2,3 | EP318925 | RELAY POWER FBR221D006 2TR 6V |
| 10-PH1 | ED323892 | PHOTO SENSOR GP-411 |
| 10-IN1 | EL330446 | PL SPL HOLDER LAMP |
| 10-TH1 | ET330533 | ⚠ POSISTER PTH61G04BD3R3N |
| 10-R31 | ER439132 | R OMF H 2W 151K |
| 10-R34 | ER330408 | R OMF H 2W 121K |

## 11. DRUM P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 11-1 | BAV1004A530A | PC DRUM MOTOR BLK VS-5EG (INCLUDING DRM MOTOR PCB & CAPSTAN MOTOR PCB) |

### DRUM MOTOR P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 11-IC101 | EI330431 | IC TA7234 |
| 11-TR101 | ET330430 | ⚠ TR 2SB632K D,E,F |
| 11-TR102 | ET200412 | TR 2SD636 Q,R,S |
| 11-TR103 | ET200415 | TR 2SB641 Q,R,S |
| 11-TR104 | ET200412 | TR 2SD636 Q,R,S |
| 11-TH101 | ET330533 | ⚠ POSISTER PTH61G04BD3R3N |
| 11-R102 | ER330537 | R OMF H SNP 2W 102J |
| 11-R103 | ER330540 | R MF H SNP 2W 2R2J |
| 11-R115 | ER330538 | R OMF H SNP 2W 331J |
| 11-R116,117 | ER330539 | R OMF H SNP 2W 221J |

### CAPSTAN MOTOR P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 11-TR1,2 | ET200415 | TR 2SB641 Q,R,S |
| 11-TR3,4 | ET200412 | TR 2SD636 Q,R,S |
| 11-TR5 | ET200741 | TR 2SD571 K,L,M |
| 11-TR6 | ET325899 | ⚠ TR 2SC1983 R |
| 11-TR7 | ET330885 | ⚠ TR 2SB857 C,D |
| 11-D1,2 | ED200469 | D SILICON H DS448 FA5 F10 |
| 11-D3 | ED327059 | D ZENER H WZ-100 |
| 11-VR1 | EV330453 | R S-FIX V H1052A 3P 0.15W 223 |
| 11-RL1 | EP318925 | RELAY POWER FBR221D006 2TR 6V |

## 12. TUNER P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 12-1 | BA705538 | PC TUNER BLK VS-5 (EG) |
| 12-2 | BA705539 | PC TUNER BLK VS-5 (EK) |
| 12-3 | EE330292 | TV TUNER CDE1-011 (EG) |
| 12-4 | EE330106 | TV TUNER CBE1-002 (EK) |
| 12-IC1 | EI705494 | IC TA7607P |
| 12-IC2 | EI704201 | IC M5144P |
| 12-TR1 | ET705480 | TR 2SC2717 |
| 12-TR2to4 | ET356962 | TR 2SC640 C |
| 12-TR5 | ET522270 | TR 2SC1210 D |
| 12-TR6to8 | ET639437 | TR 2SC945L Q,P (EG) |
| 12-TR9,10 | ET325501 | TR 2SA1015 O,Y (EG) |
| 12-TR11 | ET639437 | TR 2SC945L Q,P |
| 12-TR12 | ET325501 | TR 2SA1015 O,Y (EG) |
| 12-TR13 | ET639437 | TR 2SC945L Q,P (EG) |
| 12-TR14 | ET639437 | TR 2SC945L Q,P |
| 12-TR15 | ET325501 | TR 2SA1015 O,Y |
| 12-TR16 | ET639437 | TR 2SC945L Q,P |
| 12-D1 | ED705479 | D SILICON 1SV70 |
| 12-D2 | ED604541 | D SILICON 1S2076 |
| 12-D3to5 | ED604541 | D SILICON 1S2076 (EG) |
| 12-D7 | ED604541 | D SILICON 1S2076 (EG) |
| 12-D8 | ED604541 | D SILICON 1S2076 |
| 12-D9,10 | ED604541 | D SILICON 1S2076 (EG) |
| 12-D11,12 | ED604541 | D SILICON 1S2076 |
| 12-L1 | EO705481 | COIL FIX 1 144LZ 1μH K |
| 12-L2 | EO705482 | COIL FIX 1 144LZ 0.82μH K (EG) |
| 12-L2 | EO705481 | COIL FIX 1 144LZ 1μH K (EK) |
| 12-L3 | EO705483 | COIL FIX 1 1.4μH |
| 12-L4 | EO705484 | COIL FIX 1 4.7μH K |
| 12-L5 | EO705485 | COIL FIX 1 33μH K |
| 12-L6 | EO701411 | COIL RF SPL 15μH |
| 12-L7 | EO705487 | COIL FIX 1 100μH K |
| 12-L8 | EO701411 | COIL RF SPL 15μH |
| 12-L9 | EO705488 | COIL FIX 1 12μH K (EG) |
| 12-L9 | EO705489 | COIL FIX 1 10μH K (EK) |
| 12-T2 | EO705490 | COIL TKXNAAS-27899RY |
| 12-T3 | EO705491 | COIL TKXNS-279789NK |
| 12-T4 | EO705492 | COIL TKACS-27617NK (EG) |
| 12-T4 | EO705493 | COIL TKACS-27618NK (EK) |
| 12-CF101 | ER705495 | FILTER CE F1024 38.9MHZ (EG) |
| 12-CF101 | ER705496 | FILTER CE F1025 39.5MHZ (EK) |
| 12-CF102 | ER705499 | FILTER CE SFE 5.5MHZ (EG) |
| 12-CF102 | ER705500 | FILTER CE SFE 6MHZ (EK) |
| 12-CF103 | ER705501 | FILTER CE TPS 5.5MHZ (EG) |
| 12-CF103 | ER705502 | FILTER CE TPS 6MHZ (EK) |
| 12-VR1 | EV572433 | R S-FIX H V8K4-1 3P 504 |
| 12-VR2,3 | EV464196 | R S-FIX H V8K4-1 3P 202 |
| 12-VR4 | EV464207 | R S-FIX H V8K4-1 3P 502 |
| 12-VR5 | EV464207 | R S-FIX H V8K4-1 3P 502 (EG) |
| 12-R20 | ER702565 | ⚠ R FUSE 1/4 470J |
| 12-C8 | EC305423 | C TT V D R47M 35DC |
| 12-C12 | EC705473 | C CE LH680J 50DC |
| 12-C14 | EC705474 | C CE CH2R0C 50DC |
| 12-C25 | EC705476 | C CE RH8R0D 50DC (EG) |
| 12-C25 | EC705477 | C CE RH6R0D 50DC (EK) |
| 12-C31 | EC705478 | C CE CH620J 50DC |
| 12-C40 | EC705474 | C CE CH2R0C 50DC |
| 12-C41 | EC200481 | C CE V F05 CH 360J 50DC |
| 12-C42 | EC200494 | C CE V F05 100J 50DC |

## 13. POWER SUPPLY P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 13-1 | BA705542 | PC POWER BLK (INCLUDING POWER SUPPLY PCB, POWER SUB PCB, TR PCB) |
|  | **POWER SUPPLY P.C BOARD BLOCK** |  |
| 13-IC1 | EI301748 | ⚠ IC μPC1458C |
| 13-IC2 | EI308473 | ⚠ IC μPC141C |
| 13-TR5 | ET554657 | ⚠ TR 2SA733A P,Q |
| 13-TR8 | ET200479 | TR 2SA1115 D,E,F |
| 13-TR11 | ET301154 | ⚠ TR 2SC1162 C,D |
| 13-TR12 | ET554657 | TR 2SA733A P,Q |
| 13-TR13 | ET200925 | ⚠ TR 2SA970 GR |
| 13-TR14 | ET200925 | ⚠ TR 2SA970 GR |
| 13-TR15 | ET303895 | TR 2SD667 C,D |
| 13-TR16 | ET398711 | ⚠ TR 2SC945L Q,R |
| 13-D1 | ED705467 | ⚠ D SILICON M4B51-14 |
| 13-D2 | ED705468 | ⚠ D SILICON T1B4B41 |
| 13-D6 | ED705469 | ⚠ D ZENER HZ6C-2 |
| 13-D8 | ED705468 | D SILICON T1B4B41 |
| 13-D11 | ED329058 | ⚠ D ZENER H HZ5 C1 |
| 13-D14 | ED704267 | ⚠ D SILICON 10E-1 |
| 13-D15 | ED704267 | ⚠ D SILICON 10E-1 |
| 13-D16 | ED704267 | D SILICON 10E-1 |
| 13-D17 | ED704267 | D SILICON 10E-1 |
| 13-D18 | ED705470 | ⚠ D ZENER HZ11C1 |
| 13-D24 | ED704267 | D SILICON 10E-1 |
| 13-T1 | BT705472 | ⚠ TRANS POWER KX590176 |
| 13-F2 | EF564491 | ⚠ FUSE T 4AT CEE |
| 13-F3 | EF375647 | ⚠ FUSE T 500MAT CEE |
| 13-F4 | EF354295 | ⚠ FUSE T 1.6AT CEE |
| 13-VR1 | EV705536 | VR TM8KV-2S B501 |
| 13-R10 | ER705459 | ⚠ R FUSE FMR W 1/4W 100J |
| 13-R12 | ER705460 | R CT RGC2T 2W R100G |
| 13-R13 | ER310326 | R MF H 1/4W 1002F |
| 13-R14 | ER314599 | R MF H 1/4W 1501F |
| 13-R25 | ER310436 | R MF H 1/4W 3901F |
| 13-R44 | ER302353 | R MF H F10 1/4W 2701F |
| 13-C1 | EC705462 | C CE 222M 50DC |
| 13-C2 | EC705461 | C EC 153M 25DC |
| 13-C9,10 | EC705463 | C EC 101M 100DC |
| 13-C18 | EC705465 | C EC 472 35DC |
| 13-C30,31 | EC705466 | C EC 4R7 100DC |
|  | **POWER SUB P.C BOARD BLOCK** |  |
| 13-TR1 | ET633677 | TR 2SA490 O,Y |
| 13-TR2 | ET303895 | TR 2SD667 C,D |
| 13-TR3 | ET200479 | TR 2SA1115 D,E,F |
| 13-D3 | ED704267 | D SILICON 10E-1 |
| 13-D4 | ED704267 | D SILICON 10E-1 |
| 13-D5 | ED704267 | D SILICON 10E-1 |
| 13-D21,22 | ED704267 | D SILICON 10E-1 |
| 13-F1 | EF375660 | ⚠ FUSE T 1AT CEE |
| 13-F5 | EF375660 | ⚠ FUSE T 1AT CEE |
|  | **TR P.C BOARD BLOCK** |  |
| 13-TR6 | ET633677 | ⚠ TR 2SA490 O,Y |

## 14. REAR P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 14-1 | BAV1004A020A | PC REAR BLK VS-5EG |
| 14-J901 | EJ319158 | JACK PLATE VS-5 B0002 |
| 14-SW901 | ES319334 | SW SLIDE HSW0273-220 1-02-02 |
| 14-SW902 | ES319352 | SW SLIDE HSW0372-030 2-02-03 |
| 14-2 | ZW263946 | RV NYL40×050 |

## 15. MEMORY P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **MIC P.C BOARD BLOCK** | |
| 15-J902 | EJ330544 | PHONE J 3P HLJ0315-010 6.3 2T |
| 15-VR901 | EV319159 | VR ROTARY 16P10×1D B104 |
| | **MEMORY P.C BOARD BLOCK** | |
| 15-SW903 | ES328771 | SW PUSH SPJ222N 2-02-02N |

## 16. SENSOR P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **SENSOR P.C BOARD BLOCK** | |
| 16-TR1 | ET318308 | TR PHOTO PN202S |
| | **REC SAFETY SW P.C BOARD BLOCK** | |
| 16-SW904 | ES319156 | SW MICRO SS-1-E-4 UC |
| | **LOADING SW (A,B) P.C BOARD BLOCK** | |
| 16-SW905,906 | ES318284 | SW LEVER SCL101R23A 1-01-02N |
| | **EJECT P.C BOARD BLOCK** | |
| 16-SW907 | ES319124 | SW LEVER SCL101S 1-01-02N |

## 17. CM FILTER P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 17-L1 | EO669273 | COIL FIX 2 FL5R200 18μH |
| 17-FL1,2 | ER330465 | FILTER LC DST310-55B271M |
| 17-C1 | EC330466 | C EC V F05 NP SM 4R7M 50DC |

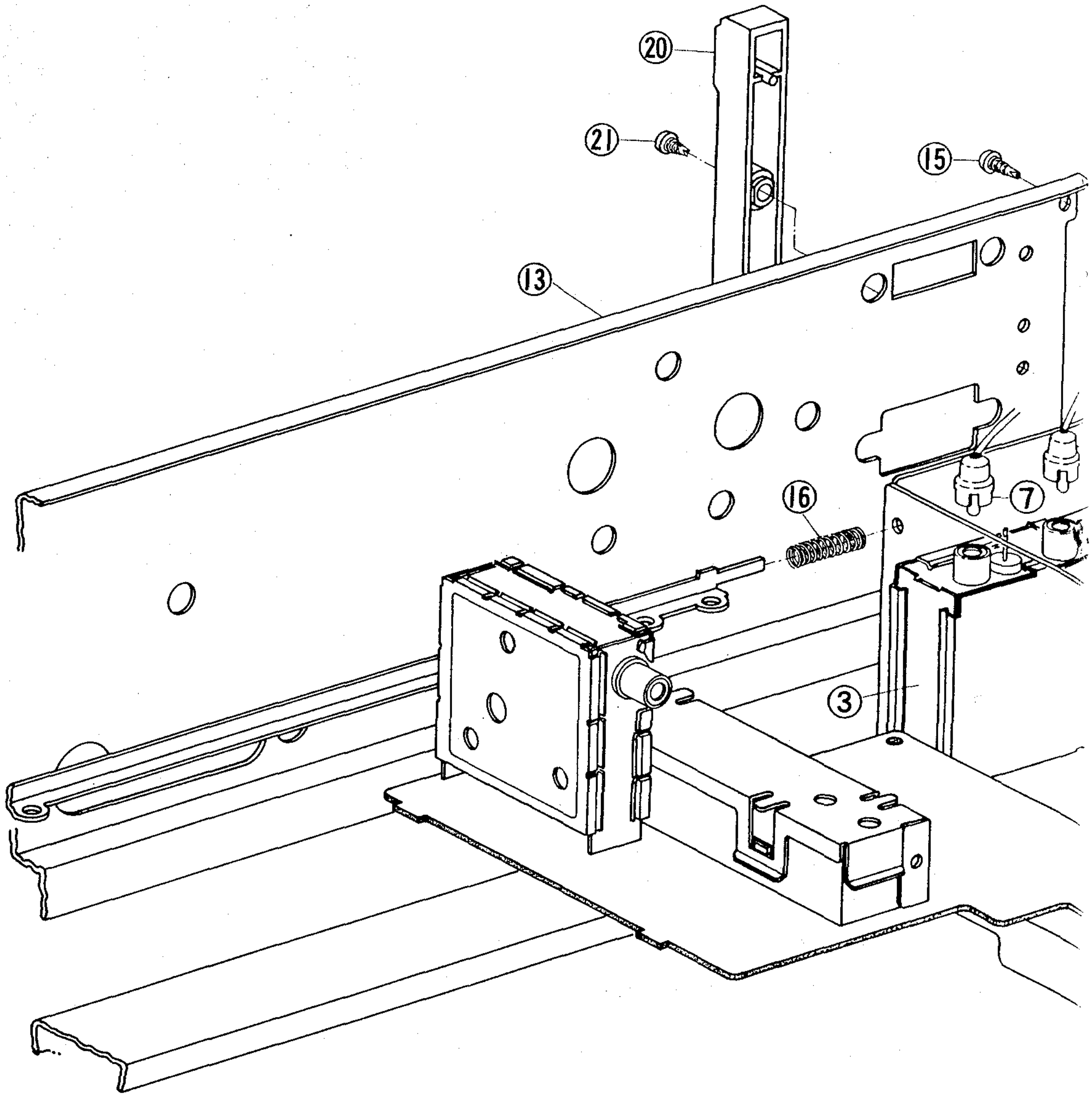
## 18. MOTOR FILTER P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 18-L1to4 | EO405630 | COIL FIX 1 FL05H 82μH K |

## 19. REMOTE CONTROL (RC-V5) BLOCK

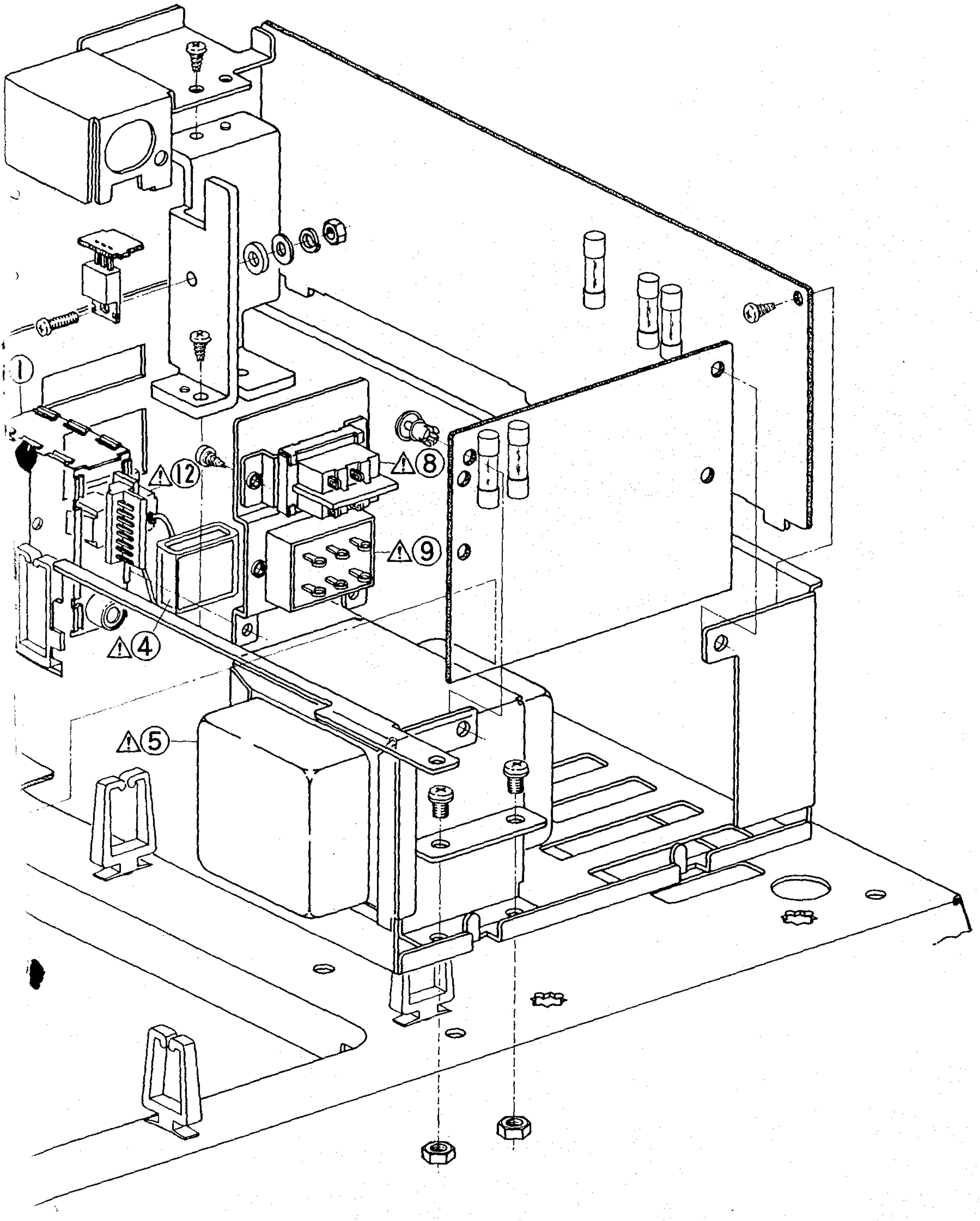
| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 19-1 | AX328710 | REMOCON UNIT RC-V5 |
| 19-IC1 | EI780020 | IC μPD1986C |
| 19-TR1 | ET328553 | TR 2SC945A K,P |
| 19-TR2 | ET318604 | TR 2SD545NP E,F |
| 19-D1,2 | ED706226 | D LED SE303A INFRARED |
| 19-D3 | ED780019 | D LED SEL1123W |
| 19-X1 | EI780021 | OSC CE |
| 19-SW1 | ES780015 | SW SLIDE |

## POWER & RF BLOCK



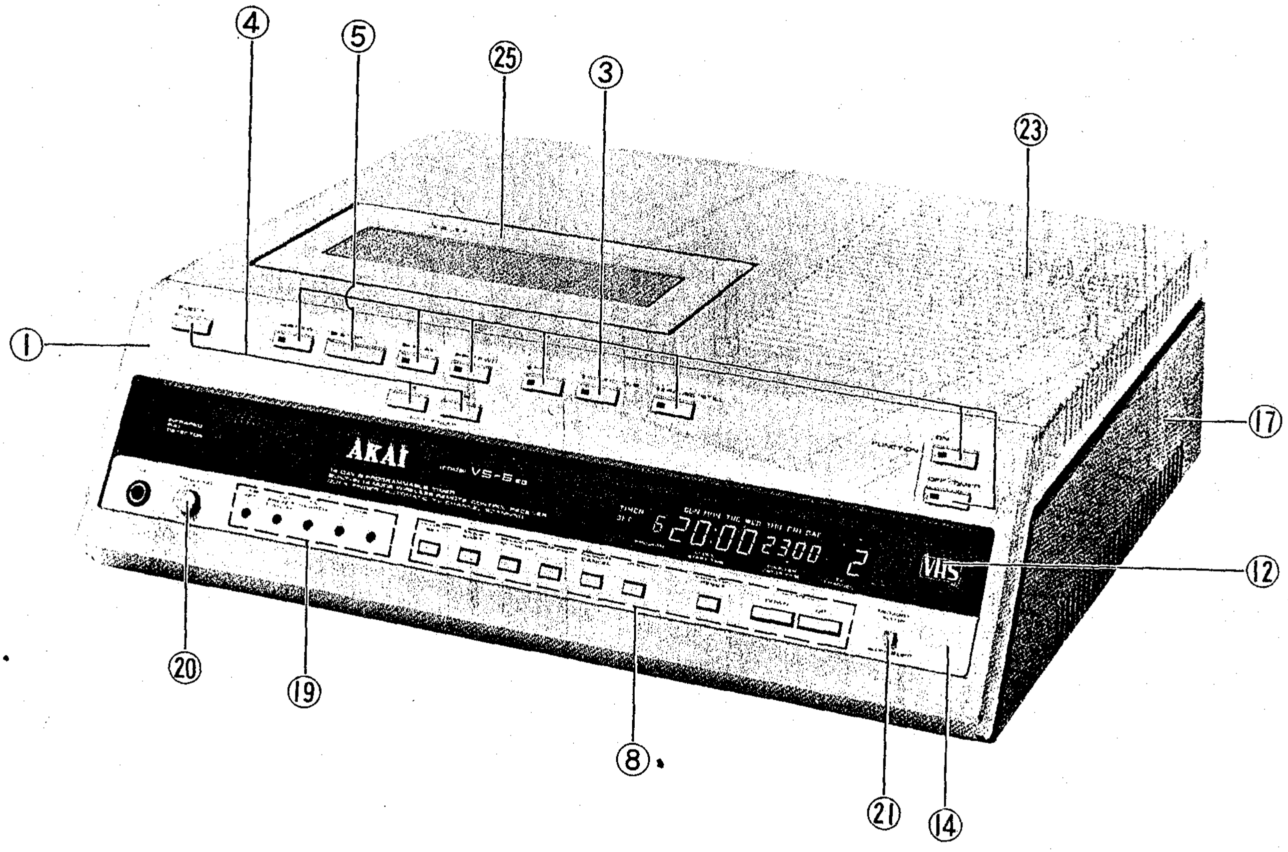
## 20. POWER & RF BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 20-1 | BV330109 | RF CONVERTER MDK3-253 (EG) |
| 20-2x | BV330110 | RF CONVERTER MBK3-253 (EK) |
| 20-3 | BV330111 | ANT BOOSTER YBC1-001 |
| 20-4 | EC325485 | ⚠ C MP V 473M 250AC |
| 20-5 | BT705526 | ⚠ TRANS POWER VS-5-1B (EG) |
| 20-6x | BT705527 | ⚠ TRANS POWER VS-5-3B (EK) |
| 20-7 | EW705529 | COAXIAL CABLE 1.5C 2V KC243462A1 |
| 20-8 | ES705533 | ⚠ SW SEESAW SDE3S2023 |
| 20-9 | ES705534 | ⚠ SW TKR-22293 |
| 20-10x | EF375660 | ⚠ FUSE T 1AT CEE |
| 20-11x | EJ592503 | FUSE CLIP H0426-A 5.2MM |



| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 20-12 | EJ301513 | ⚠ SOCKET INLET S-I6453 E 2P |
| 20-13 | SP328220A | PANEL REAR VS-5EG |
| 20-14x | SP328220B | PANEL REAR VS-5EK |
| 20-15 | ZS447761 | T2BR30×06STL BNI |
| 20-16 | ZG313193 | SP C-4.5/0.6-20.0-0 C-040 |
| 20-17x | VT327946 | HOLE PLUG 417 |
| 20-18x | ZS330841 | -FFL20×1.8STL NI3 |
| 20-19x | MZ327113 | SHIELD CASE PRE AMP (A) |
| 20-20 | SA327691 | FOOT VERTICAL |
| 20-21 | ZS463353 | T2BR30×08STL BNI |

## FINAL ASSEMBLY BLOCK



## 21. FINAL ASSEMBLY BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | FRONT PANEL BLOCK | |
| 21-1 | BDV1004A430A | PANEL FRONT BLK VS-5EG |
| 21-2x | BDV1004A430B | PANEL FRONT BLK VS-5EK |
| 21-3 | SK327694 | KNOB OPERATION |
| 21-4 | SK327685 | KNOB OPERATION SUB |
| 21-5 | SK327684 | KNOB STOP |
| 21-6x | MZ327509 | HOLDER CASE |
| 21-7x | ZS310984 | PT BR30×08STL CMT |
| 21-8 | SK327676 | KNOB FUNCTION |
| 21-9x | ZG332009 | PT BR30×06STL CMT |
| 21-10 | SK327682 | KNOB SUB FUNCTION |
| 21-11x | ZS310984 | PT BR30×08STL CMT |
| 21-12 | BDB327392A | PANEL DISPLAY VS-5EG PART |
| 21-13x | BDB327392B | PANEL DISPLAY VS-5EK PART |
| 21-14 | SP327469A | PANEL FUNCTION (A) (ENGLISH) |
| 21-15x | VT327847 | TRAN LEG T-H |
| 21-16x | ZS523664 | T2BR30×10STL CMT |
| 21-17 | SP327692 | CASE SIDE (R) |
| 21-18x | ZS311745 | T2BR30×08STL BNI PW080 |
| 21-19x | SP327693 | CASE SIDE (L) |
| 21-20 | SK327689 | KNOB TRACKING |
| | FINAL ASSEMBLY BLOCK | |
| 21-21 | SK327686 | KNOB PUSH |
| 21-22x | ZW322110 | PW61×100×100NYL |
| 21-23 | SP327696 | CASE UPPER |
| 21-24x | ZS321783 | ST BID40×10STL NI3 |
| 21-25 | BD327698A | LID CASSETTE (ENGLISH) |
| 21-26x | SP327697 | COVER BOTTOM |
| 21-27x | ZS311745 | T2BR30×08STL BNI PW080 |
| 21-28x | EW315767 | ⚠ AC CORD 2 CORES KP-419C/KS-15 E (EG) |
| 21-29x | EW322400 | ⚠ AC CORD 2 CORES GTBS-2F/KS-15 B (EK) |
| 21-30x | EW321758 | CORD VY-15 ANTENNA CABLE |

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| MIB328611 | 4-37 |
| MI322304 | 3-47 |
| MI326478 | 2-1 |
| MI327773 | 3-33 |
| MLB326296 | 3-5 |
| MLV1004A090A | 3-39 |
| MLB1004A100A | 3-40 |
| ML330640 | 3-37 |
| ML780036 | 4-21 |
| MV322302 | 4-5 |
| MBZ321701 | 4-3 |
| MZ327113 | 20-19x |
| MZ327509 | 21-6x |
| SA327691 | 20-20 |
| SK327676 | 21-8 |
| SK327682 | 21-10 |
| SK327684 | 21-5 |
| SK327685 | 21-4 |
| SK327686 | 21-21 |
| SK327689 | 21-20 |
| SK327694 | 21-3 |
| SP327469A | 21-14 |
| SP-327692 | 21-17 |
| SP327693 | 21-19x |
| SP327696 | 21-23 |
| SP327697 | 21-26x |
| SP328220A | 20-13 |
| SP328220B | 20-14x |
| TP326491 | 6-3 |
| VTB319445 | 3-10 |
| VTB319446 | 3-16 |
| VTB326329 | 3-9 |
| VTB326468 | 3-17 |
| VTB327708 | 2-2 |
| VTB327729 | 2-3 |
| VT317947 | 3-11 |
| VT318087 | 2-14 |
| VT318088 | 2-16 |
| VT322159 | 3-41 |
| VT325900 | 7-2 |
| VT326470 | 3-20 |
| VT326471 | 3-61 |
| VT326476 | 4-39 |
| VT326477 | 3-62 |
| VT326610 | 9-7 |
| VT326787 | 9-9 |
| VT326829 | 9-8 |
| VT326856 | 9-4 |
| VT326870 | 9-5 |
| VT326873 | 9-6 |
| VT327211 | 9-2 |
| VT327212 | 9-3 |
| VT327847 | 21-15x |
| VT327946 | 20-17x |
| VT328134 | 3-18 |
| VT780025 | 4-13 |
| VT780026 | 4-14 |
| VT780027 | 4-15 |
| VT780028 | 4-16 |
| ZG312955 | 3-43 |
| ZG313001 | 3-34 |
| ZG313085 | 4-31 |
| ZG313193 | 20-16 |
| ZG318043 | 3-13 |
| ZG318204 | 3-42 |
| ZG318228 | 3-52 |
| ZG318228 | 3-44 |
| ZG321769 | 4-34 |
| ZG326247 | 3-54 |
| ZG327736 | 2-24 |
| ZG327740 | 2-25 |
| ZG327757 | 2-12 |
| ZG328225 | 3-29 |
| ZG328610 | 4-30 |
| ZG328661 | 4-9 |
| ZG330058 | 3-6 |
| ZG330641 | 2-8 |
| ZG330868 | 2-18 |
| ZG331128 | 3-19 |
| ZG331178 | 2-20 |
| ZG332009 | 21-9x |
| ZG332459 | 2-9 |
| ZG332463 | 3-36 |
| ZG780032 | 4-18 |
| ZG780035 | 4-20 |
| ZG780037 | 4-22 |
| ZG780038 | 4-23 |
| ZG780039 | 4-24 |
| ZG780040 | 4-25 |
| ZS200614 | 3-60 |
| ZS305246 | 2-17 |
| ZS310984 | 3-21 |
| ZS310984 | 21-11x |
| ZS310984 | 21-7x |
| ZS311745 | 21-18x |
| ZS311745 | 21-27x |
| ZS318212 | 3-12 |
| ZS321298 | 2-15 |
| ZS321783 | 21-24x |
| ZS323993 | 3-58 |
| ZS323993 | 4-42 |
| ZS325495 | 3-51 |
| ZS325495 | 3-28 |
| ZS326246 | 3-55 |
| ZS328607 | 3-32 |
| ZS328607 | 4-2 |
| ZS328608 | 3-56 |
| ZS330841 | 20-18x |
| ZS379350 | 4-41 |
| ZS379350 | 4-4 |
| ZS421806 | 2-30x |
| ZS421806 | 2-10 |
| ZS444330 | 4-6 |
| ZS447761 | 20-15 |
| ZS463353 | 20-21 |
| ZS477876 | 3-3 |
| ZS477876 | 3-8 |
| ZS523664 | 21-16x |
| ZS558101 | 3-23x |
| ZS609491 | 2-32x |
| ZW259334 | 2-5 |
| ZW259503 | 3-35 |
| ZW259738 | 4-40x |
| ZW263946 | 14-2 |
| ZW269954 | 3-59x |
| ZW270101 | 4-32 |
| ZW290283 | 4-33 |
| ZW306464 | 2-19 |
| ZW306464 | 3-26 |
| ZW322110 | 21-22x |
| ZW324417 | 3-48 |
| ZW328150 | 2-31x |
| ZW340648 | 2-26 |
| ZW356657 | 2-4 |
| ZW357164 | 2-23 |
| ZW357164 | 3-49 |
| ZW357164 | 3-14 |
| ZW357164 | 4-8 |
| ZW516993 | 2-22 |
| ZW516993 | 3-27 |
| ZW516993 | 3-31 |
| ZW550642 | 2-21 |

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| ZW609434 | 4-1 | | | | | | |
| ZW653163 | 3-38 | | | | | | |
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## SECTION 3

# SCHEMATIC DIAGRAM

1. SCHEMATIC DIAGRAM OF ICs
2. VS-5 EG/EK NO. 12-1 1621636A CONNECTION DIAGRAM
3. VS-5 EG/EK NO. 12-2 1621637A VIDEO BLOCK DIAGRAM
4. VS-5 EG/EK NO. 12-3 1621638A VIDEO (PAL) SCHEMATIC DIAGRAM
5. VS-5 EG/EK NO. 12-4 1621639A AUDIO SCHEMATIC DIAGRAM
6. VS-5 EG/EK NO. 12-5 1621640A SYSCON SCHEMATIC DIAGRAM
7. VS-5 EG/EK NO. 12-6 1621641A SERVO SCHEMATIC DIAGRAM
8. VS-5 EG/EK, RC-V5 NO. 12-7 1621642A DISPLAY SCHEMATIC DIAGRAM
9. VS-5 EG/EK NO. 12-8 1621643A DRIVE SCHEMATIC DIAGRAM
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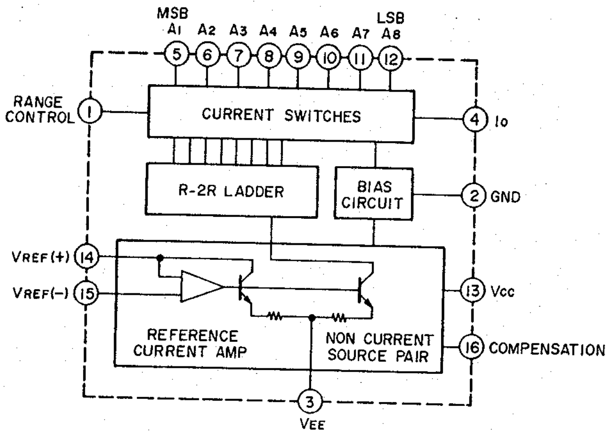
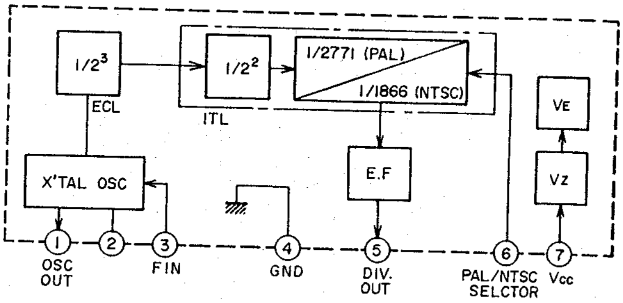
11. VS-5 EG/EK NO. 12-10 1621645A POWER SUPPLY SCHEMATIC DIAGRAM
12. VS-5 EG NO. 12-11 1621646A TUNER SCHEMATIC DIAGRAM
13. VS-5 EK NO. 12-12 1621647A TUNER SCHEMATIC DIAGRAM

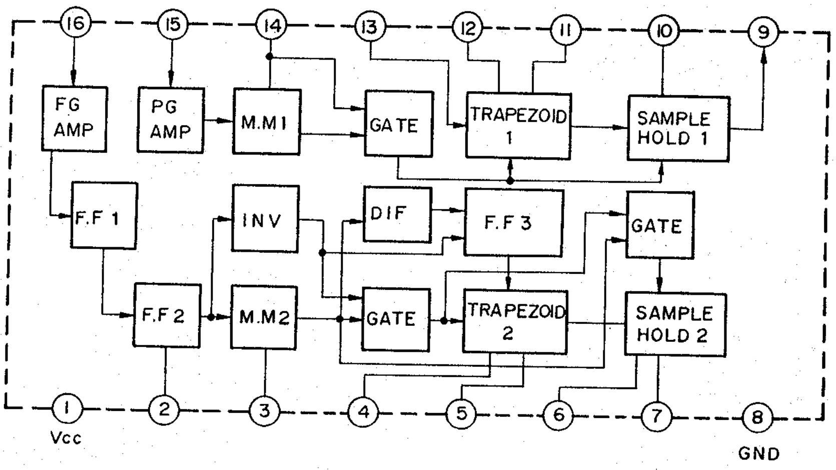
## AM1408A8


MSB
A1
A2
A3
A4
A5
A6
A7
LSB
A8
5
6
7
8
9
10
11
12
RANGE CONTROL
1
CURRENT SWITCHES
4
Io
R-2R LADDER
BIAS CIRCUIT
2
GND
VREF(+)
14
VREF(−)
15
13
Vcc
REFERENCE CURRENT AMP
NON CURRENT SOURCE PAIR
16
COMPENSATION
3
VEE

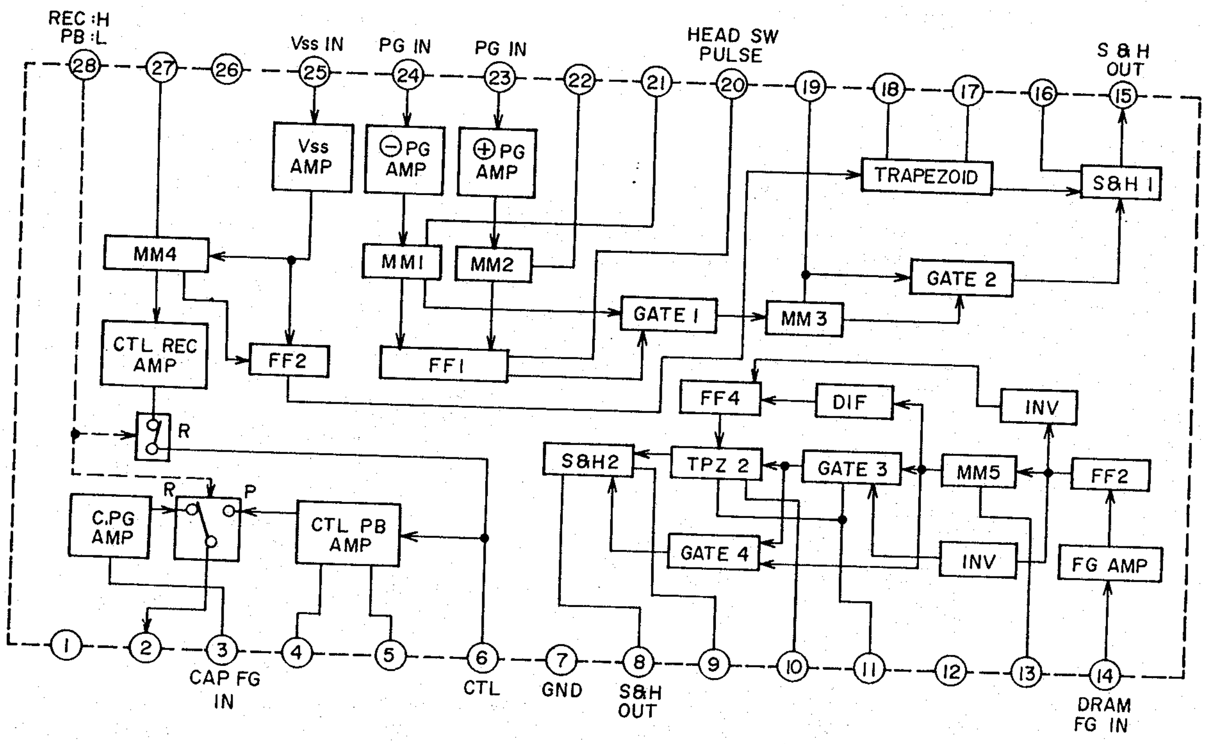
## AN6342N


1/2³
ECL
1/2²
1/2771 (PAL)
1/1866 (NTSC)
ITL
VE
X'TAL OSC
E.F
VZ
1
2
3
4
5
6
7
OSC OUT
FIN
GND
DIV. OUT
PAL/NTSC SELCTOR
Vcc

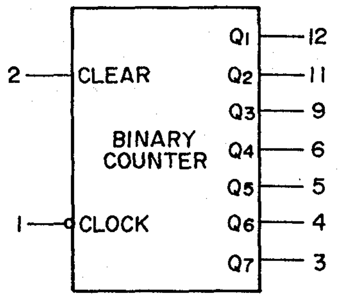
## AN6341N


16
15
14
13
12
11
10
9
FG AMP
PG AMP
M.M1
GATE
TRAPEZOID 1
SAMPLE HOLD 1
F.F 1
INV
DIF
F.F 3
GATE
F.F 2
M.M2
GATE
TRAPEZOID 2
SAMPLE HOLD 2
1
2
3
4
5
6
7
8
Vcc
GND

## AN6350


REC :H
PB :L
28
27
26
Vss IN
25
PG IN
24
PG IN
23
22
21
HEAD SW PULSE
20
19
18
17
16
S & H OUT
15
Vss AMP
⊖PG AMP
⊕PG AMP
TRAPEZOID
S&H 1
MM4
MM1
MM2
GATE 2
GATE 1
MM3
CTL REC AMP
FF2
FF1
FF4
DIF
INV
R
S&H2
TPZ 2
GATE 3
MM5
FF2
R
P
C.PG AMP
CTL PB AMP
GATE 4
INV
FG AMP
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CAP FG IN
CTL
GND
S&H OUT
DRAM FG IN

## HD14024BP

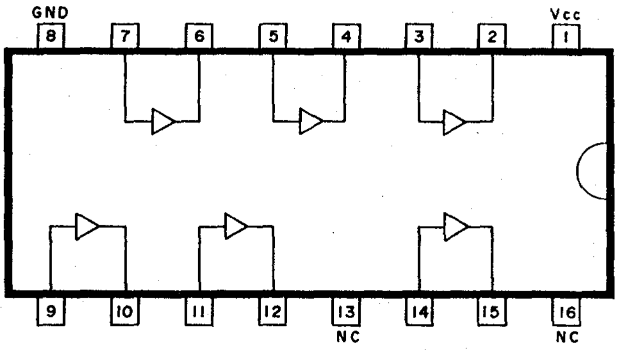

Q1 — 12
2 — CLEAR
Q2 — 11
Q3 — 9
BINARY COUNTER
Q4 — 6
Q5 — 5
1 — CLOCK
Q6 — 4
Q7 — 3

$V_{DD}$ : 14
$V_{SS}$ : 7
NC : 8,10,13

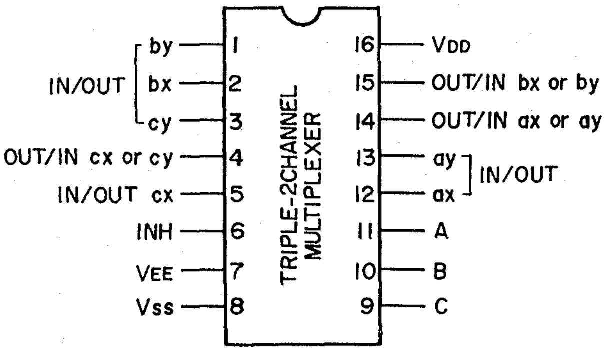
| CLOCK △ | CLEAR | OUTPUT STATE |
|---|---|---|
| ※ | H | ALL OUTPUTS="L" |
| ↑ | L | NO CHANGE |
| ↓ | L | ADVANCE TO NEXT STATE |

△:LEVEL CHANGE, ※:DON'T CARE

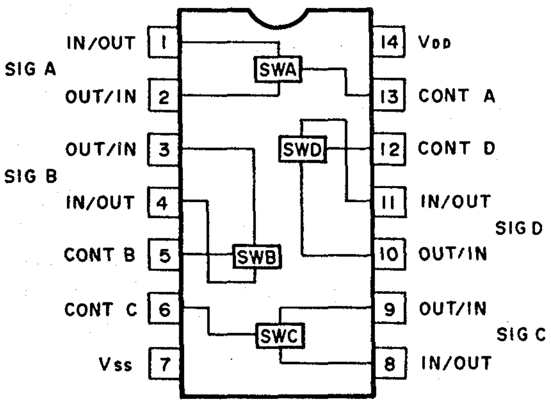
## MC14050BCP


GND
8
7
6
5
4
3
2
Vcc
1
9
10
11
12
13
NC
14
15
16
NC

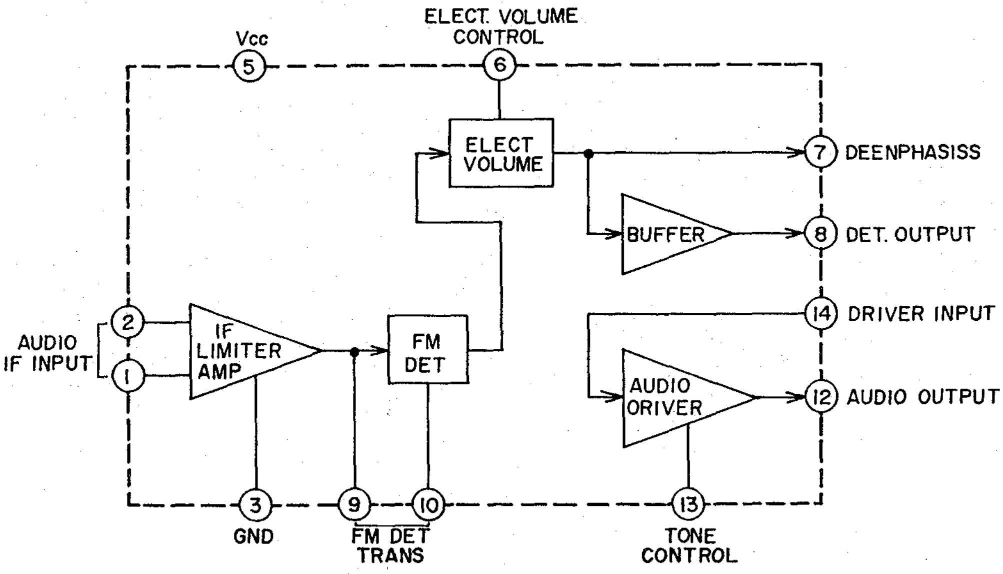
## HD14053BP


TRIPLE-2CHANNEL MULTIPLEXER
IN/OUT
by — 1
bx — 2
cy — 3
OUT/IN cx or cy — 4
IN/OUT cx — 5
INH — 6
VEE — 7
Vss — 8
16 — VDD
15 — OUT/IN bx or by
14 — OUT/IN ax or ay
13 — ay
12 — ax
IN/OUT
11 — A
10 — B
9 — C

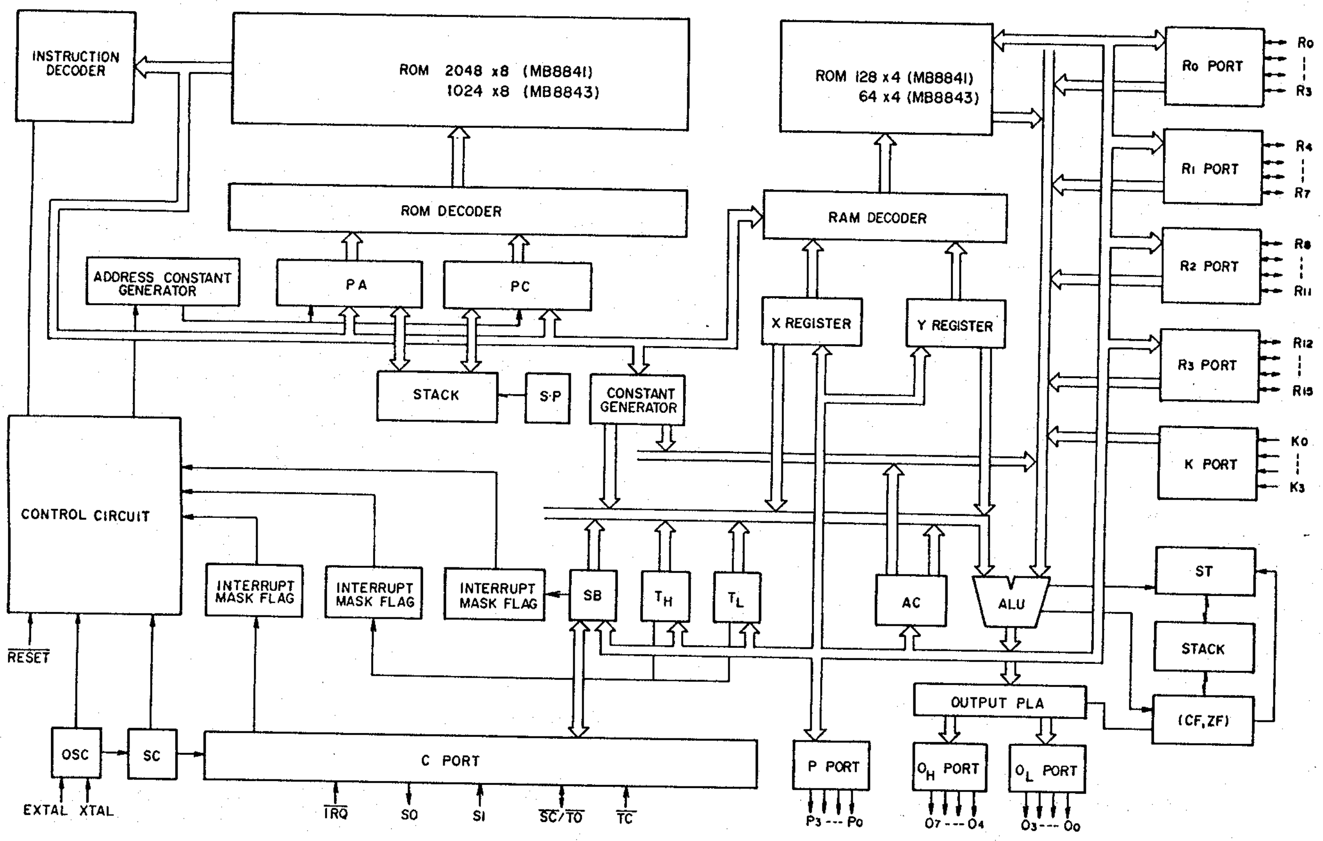
## MC14066BCP


SIG A
IN/OUT 1
OUT/IN 2
SIG B
OUT/IN 3
IN/OUT 4
CONT B 5
CONT C 6
Vss 7
14 VDD
13 CONT A
12 CONT D
11 IN/OUT
SIG D
10 OUT/IN
9 OUT/IN
SIG C
8 IN/OUT
SWA
SWD
SWB
SWC

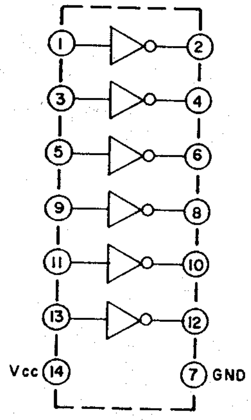
## M5144P


Vcc
5
ELECT. VOLUME CONTROL
6
ELECT VOLUME
7 DEENPHASISS
BUFFER
8 DET. OUTPUT
14 DRIVER INPUT
AUDIO IF INPUT
2
1
IF LIMITER AMP
FM DET
AUDIO ORIVER
12 AUDIO OUTPUT
3
GND
9
10
FM DET TRANS
13
TONE CONTROL

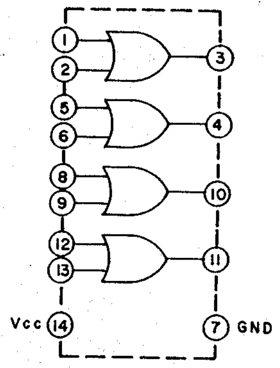
## MB8841-462J/MB8843-501M


INSTRUCTION DECODER
ROM 2048 x8 (MB8841)
1024 x8 (MB8843)
ROM 128 x4 (MB8841)
64 x4 (MB8843)
R0 PORT
R0
R3
R1 PORT
R4
R7
R2 PORT
R8
R11
R3 PORT
R12
R15
K PORT
K0
K3
ROM DECODER
RAM DECODER
ADDRESS CONSTANT GENERATOR
PA
PC
X REGISTER
Y REGISTER
STACK
S·P
CONSTANT GENERATOR
CONTROL CIRCUIT
INTERRUPT MASK FLAG
INTERRUPT MASK FLAG
INTERRUPT MASK FLAG
SB
$T_H$
$T_L$
AC
ALU
ST
STACK
(CF,ZF)
OUTPUT PLA
RESET
OSC
SC
EXTAL
XTAL
C PORT
IRQ
SO
SI
SC/TO
TC
P PORT
P3 --- P0
$O_H$ PORT
O7 --- O4
$O_L$ PORT
O3 --- O0

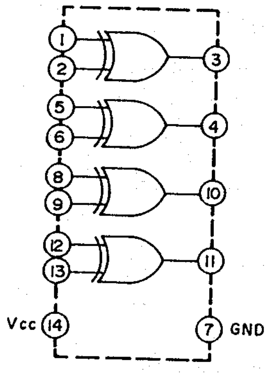
## MC14069UBCP


1
2
3
4
5
6
9
8
11
10
13
12
Vcc 14
7 GND

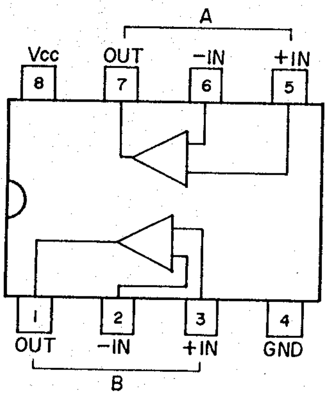
## MC14071BP


1
2
3
5
6
4
8
9
10
12
13
11
Vcc 14
7 GND

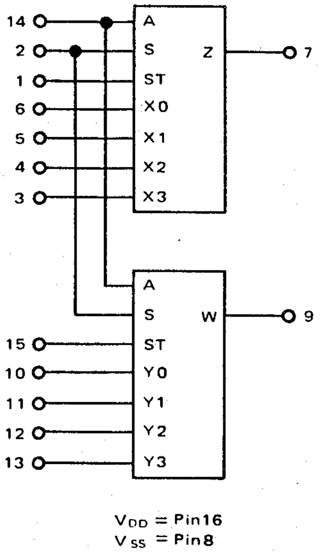
## MC14070BCP


1
2
3
5
6
4
8
9
10
12
13
11
Vcc 14
7 GND

## MC1458P/LM2903P/μPC1458


A
Vcc
OUT
−IN
+IN
8
7
6
5
1
2
3
4
OUT
−IN
+IN
GND
B

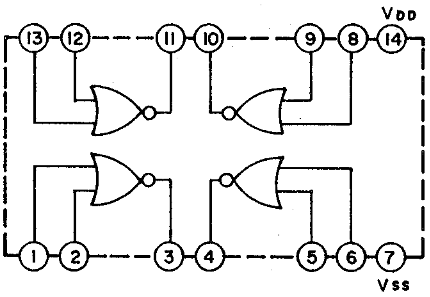
## MC14539BCP


14
2
1
6
5
4
3
A
S
ST
X0
X1
X2
X3
Z
7
A
S
ST
Y0
Y1
Y2
Y3
W
9
15
10
11
12
13
VDD = Pin16
VSS = Pin8

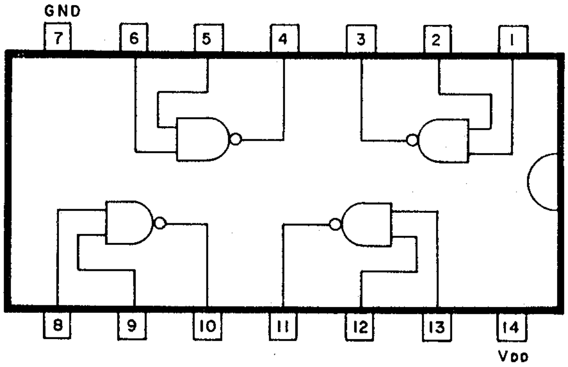
| ADDRESS INPUTS |  | DATA INPUTS |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| S | A | X3<br>Y3 | X2<br>Y2 | X1<br>Y1 | X0<br>Y0 | ST,ST | OUT PUTS<br>Z,W |
| X | X | X | X | X | X | 1 | 0 |
| 0 | 0 | X | X | X | 0 | 0 | 0 |
| 0 | 0 | X | X | X | 1 | 0 | 1 |
| 0 | 1 | X | X | 0 | X | 0 | 0 |
| 0 | 1 | X | X | 1 | X | 0 | 1 |
| 1 | 0 | X | 0 | X | X | 0 | 0 |
| 1 | 0 | X | 1 | X | X | 0 | 1 |
| 1 | 1 | 0 | X | X | X | 0 | 0 |
| 1 | 1 | 1 | X | X | X | 0 | 1 |

X = Don't Care

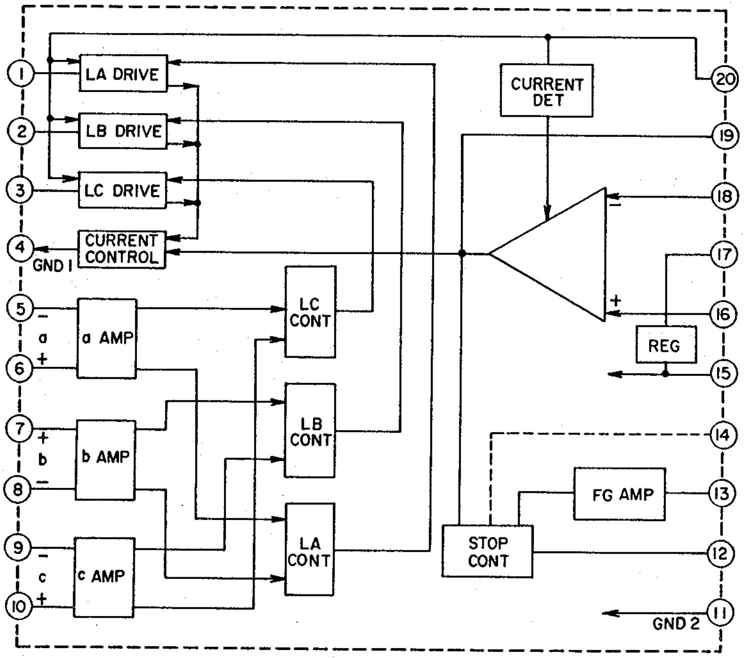
## TC4001BP


VDD
⑬
⑫
⑪
⑩
⑨
⑧
⑭
①
②
③
④
⑤
⑥
⑦
Vss

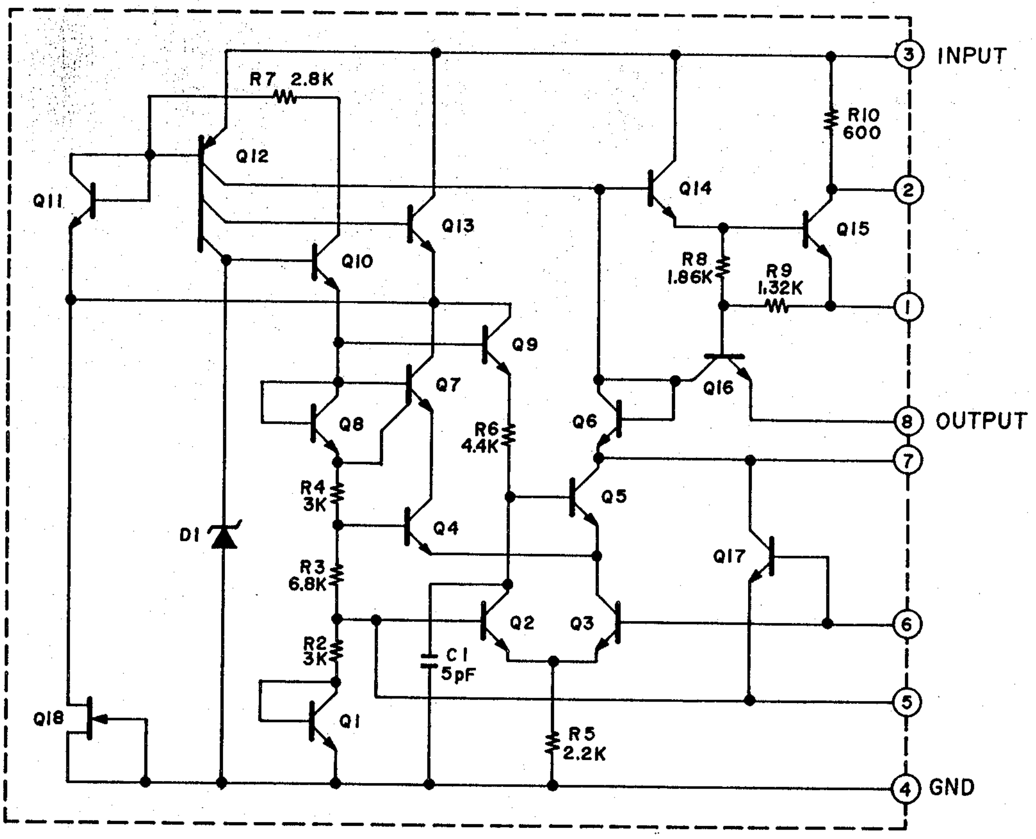
## TC4011BP


GND
7
6
5
4
3
2
1
8
9
10
11
12
13
14
VDD

## TA7234

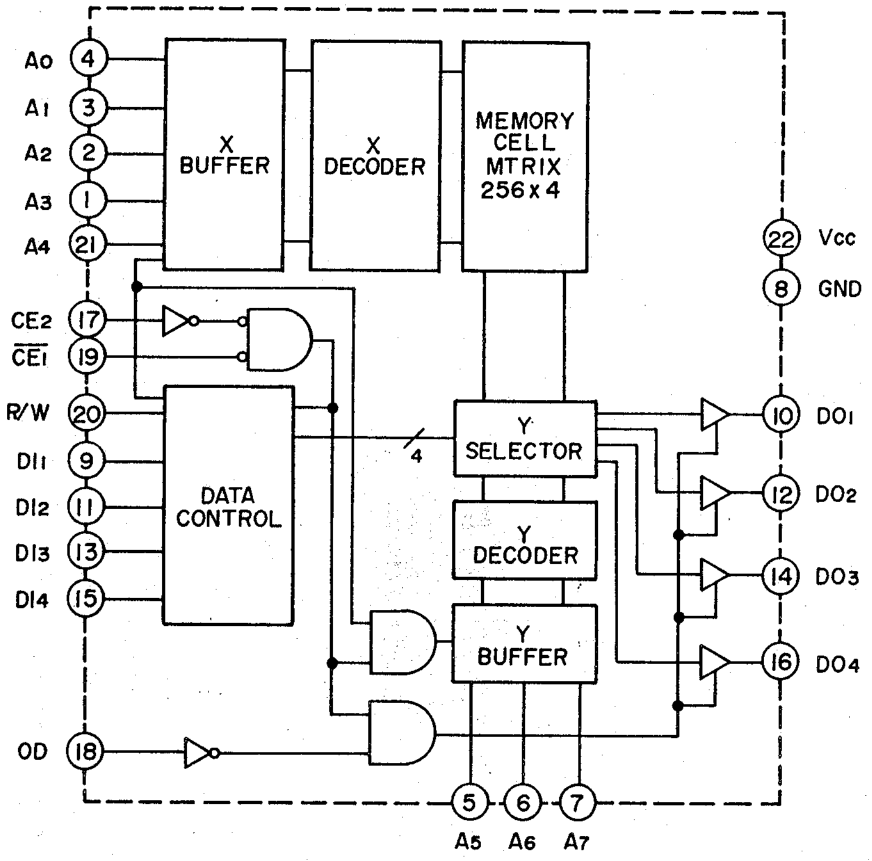

①
②
③
④
GND I
⑤
⑥
⑦
⑧
⑨
⑩
LA DRIVE
LB DRIVE
LC DRIVE
CURRENT CONTROL
a AMP
b AMP
c AMP
a
b
c
LC CONT
LB CONT
LA CONT
CURRENT DET
STOP CONT
FG AMP
REG
GND 2
⑳
⑲
⑱
⑰
⑯
⑮
⑭
⑬
⑫
⑪

## μPC141C



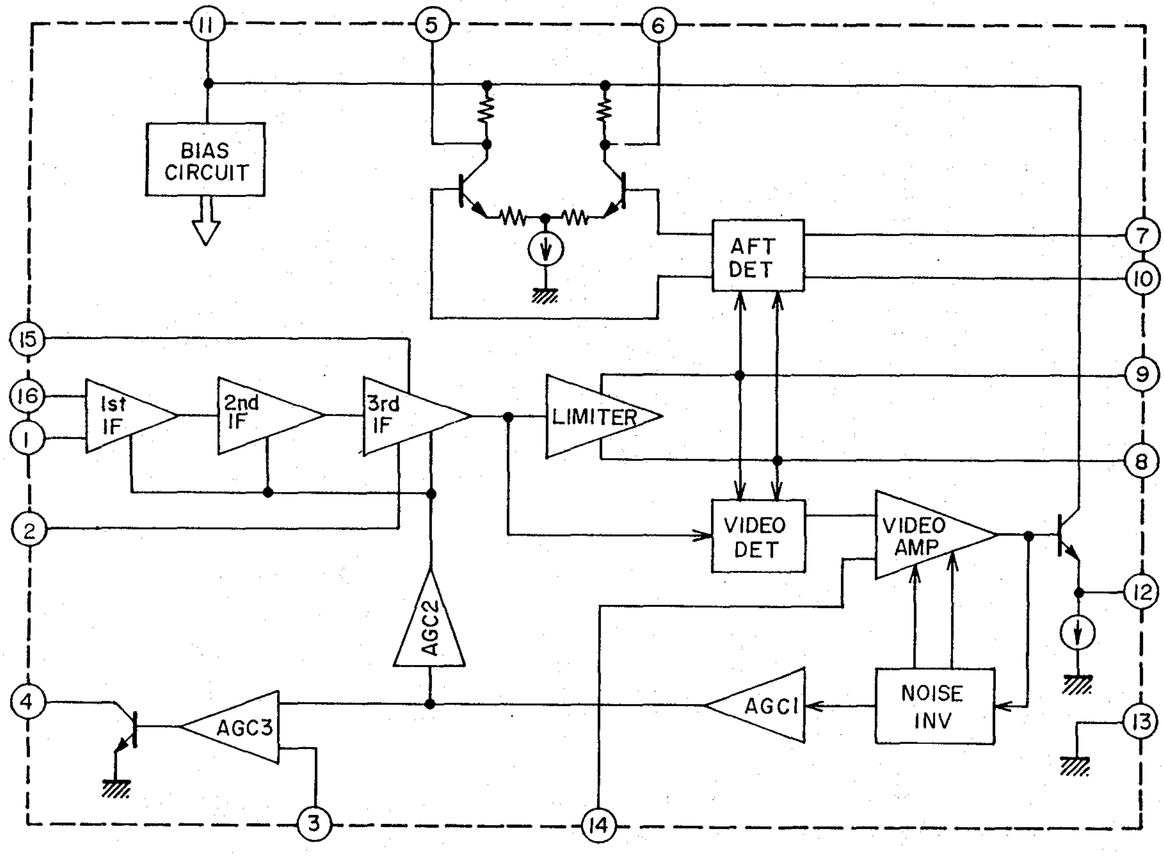
3 INPUT
R7 2.8K
R10 600
Q12
Q11
Q14
2
Q13
Q15
Q10
R8 1.86K
R9 1.32K
1
Q9
Q7
Q16
Q8
R6 4.4K
Q6
8 OUTPUT
7
R4 3K
Q5
Q4
D1
Q17
R3 6.8K
Q2
Q3
6
R2 3K
C1 5pF
5
Q18
Q1
R5 2.2K
4 GND

## μPD5101LC

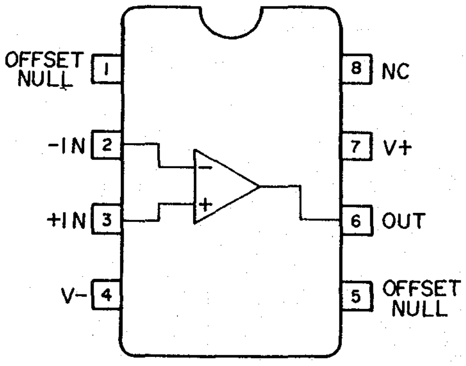


A0 4
A1 3
A2 2
A3 1
A4 21
X BUFFER
X DECODER
MEMORY CELL MTRIX 256 x 4
22 Vcc
8 GND
CE2 17
CE1 19
R/W 20
DI1 9
DI2 11
DI3 13
DI4 15
DATA CONTROL
4
Y SELECTOR
Y DECODER
Y BUFFER
10 DO1
12 DO2
14 DO3
16 DO4
OD 18
5 A5
6 A6
7 A7

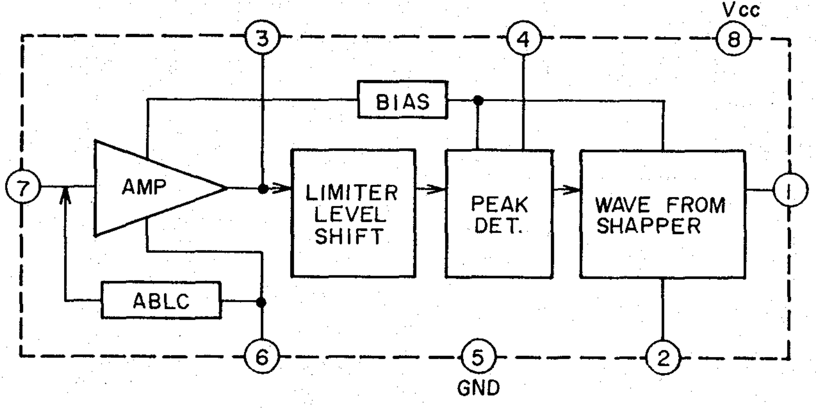
## TA7607P


11
5
6
BIAS CIRCUIT
AFT DET
7
10
15
16
1
1st IF
2nd IF
3rd IF
LIMITER
9
8
2
VIDEO DET
VIDEO AMP
12
AGC2
4
AGC3
AGCI
NOISE INV
13
3
14

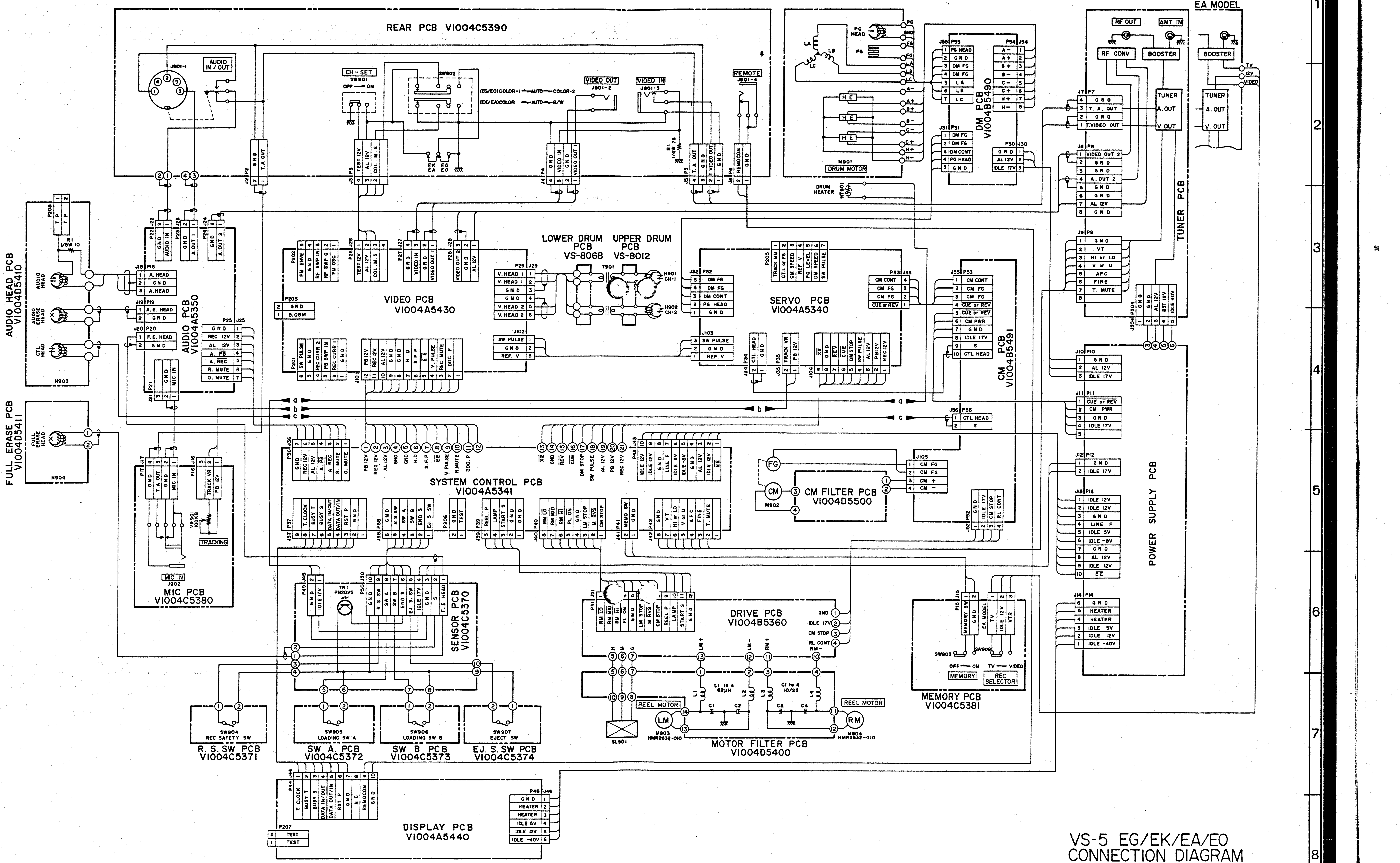
## μA741CP/TL082CP


OFFSET NULL
1
-IN
2
+IN
3
V-
4
8
NC
7
V+
6
OUT
5
OFFSET NULL
−
+

## μPC1373H

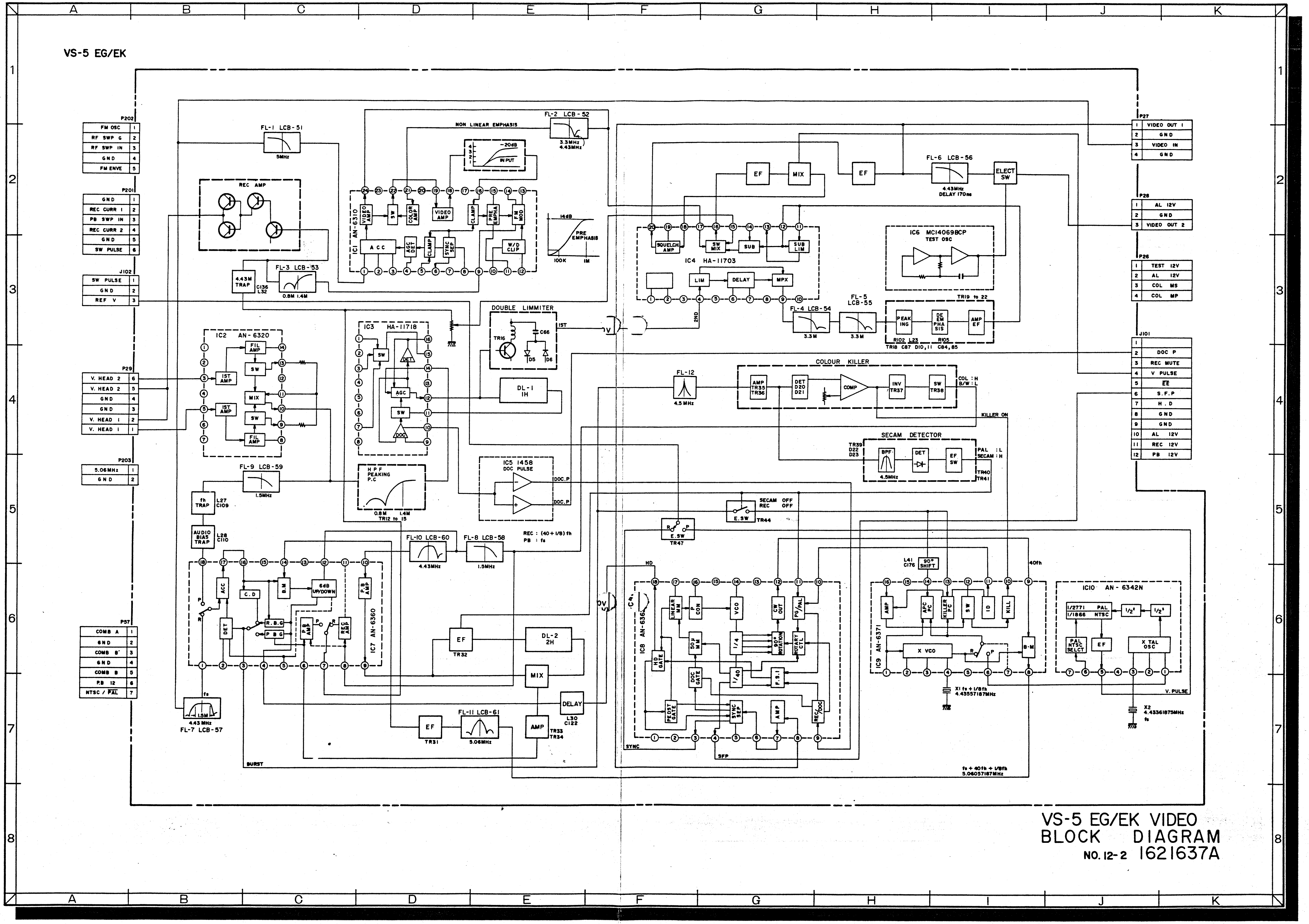

3
4
Vcc
8
BIAS
7
AMP
LIMITER LEVEL SHIFT
PEAK DET.
WAVE FROM SHAPPER
1
ABLC
6
5
GND
2

VS-5 EG/EK/EA/EO

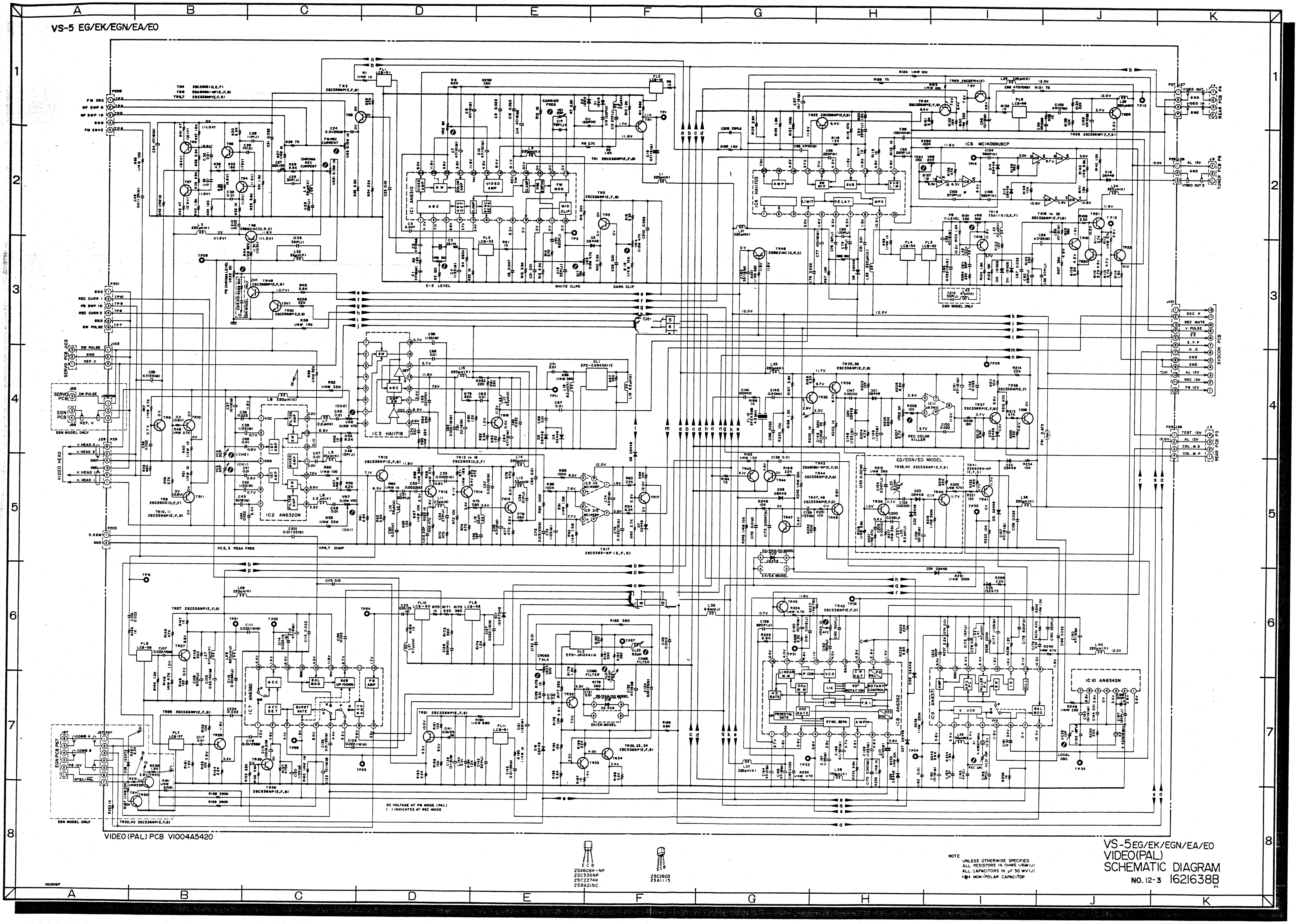

REAR PCB V1004C5390
AUDIO IN / OUT
CH-SET
SW901
SW902
(EG/EO)COLOR-1 — AUTO — COLOR-2
(EK/EA)COLOR — AUTO — B/W
VIDEO OUT
J901-2
VIDEO IN
J901-3
REMOTE
J901-4
PG HEAD
FG
M901
DRUM MOTOR
DRUM HEATER
DM PCB V1004B5490
EA MODEL
RF OUT
ANT IN
RF CONV
BOOSTER
TUNER
A.OUT
V.OUT
TUNER PCB
AUDIO HEAD PCB V1004D5410
AUDIO PCB V1004A5350
FULL ERASE PCB V1004D5411
H903
H904
VIDEO PCB V1004A5430
LOWER DRUM PCB VS-8068
UPPER DRUM PCB VS-8012
T901
H901 CH-1
H902 CH-2
SERVO PCB V1004A5340
CM PCB V1004B5491
SYSTEM CONTROL PCB V1004A5341
MIC PCB V1004C5380
MIC IN
J902
TRACKING
CM FILTER PCB V1004D5500
M902
POWER SUPPLY PCB
SENSOR PCB V1004C5370
TR1 PN2025
DRIVE PCB V1004B5360
MEMORY PCB V1004C5381
SW903
SW909
MEMORY
REC SELECTOR
SW904 REC SAFETY SW
R. S. SW PCB V1004C5371
SW905 LOADING SW A
SW A. PCB V1004C5372
SW906 LOADING SW B
SW B PCB V1004C5373
SW907 EJECT SW
EJ. S. SW PCB V1004C5374
SL901
REEL MOTOR
M903 HMR2632-010
M904 HMR2632-010
MOTOR FILTER PCB V1004D5400
L1 to 4 82μH
C1 to 4 10/25
DISPLAY PCB V1004A5440

VS-5 EG/EK/EA/EO
CONNECTION DIAGRAM
NO.12-1 1621636C

001205


VS-5 EG/EK
A B C D E F G H I J K
1 2 3 4 5 6 7 8
P202
FM OSC 1
RF SWP G 2
RF SWP IN 3
GND 4
FM ENVE 5
P201
GND 1
REC CURR 1 2
PB SWP IN 3
REC CURR 2 4
GND 5
SW PULSE 6
J102
SW PULSE 1
GND 2
REF V 3
P29
V. HEAD 2 6
V. HEAD 2 5
GND 4
GND 3
V. HEAD 1 2
V. HEAD 1 1
P203
5.06MHz 1
GND 2
P57
COMB A 1
GND 2
COMB B' 3
GND 4
COMB B 5
P.B 12 6
NTSC / PAL 7
FL-1 LCB-51
5MHz
REC AMP
4.43M TRAP
C136 L32
FL-3 LCB-53
0.8M 1.4M
NON LINEAR EMPHASIS
FL-2 LCB-52
3.3MHz 4.43MHz
-20dB
INPUT
IC1 AN-6310
VIDEO AMP
SW
COLOR AMP
VIDEO AMP
CLAMP
PRE EMPHA
FM MOD
ACC
AGC DET
CLAMP
SYNC SEP
W/D CLIP
14dB
PRE EMPHASIS
100K
1M
IC2 AN-6320
FIL AMP
SW
1ST AMP
MIX
IC3 HA-11718
DET
AGC
DOC
DOUBLE LIMMITER
TR16
C66
D5 D6
1ST
DL-1 1H
FL-9 LCB-59
1.5MHz
H P F PEAKING P.C
0.8M 1.4M
TR12 to 15
IC5 1458 DOC PULSE
DOC.P
fh TRAP L27 C109
AUDIO BIAS TRAP L28 C110
FL-10 LCB-60
4.43MHz
FL-8 LCB-58
1.5MHz
REC : (40+1/8) fh
PB : fs
C.D
B.M
6dB UP/DOWN
P.B AMP
R.B.G
P.B.G
REC AMP
IC7 AN-6360
P
R
EF TR32
DL-2 2H
MIX
DELAY L30 C122
AMP TR33 TR34
EF TR31
FL-11 LCB-61
5.06MHz
fs
4.43 MHz
1.5M
FL-7 LCB-57
BURST
IC4 HA-11703
EF
MIX
SQUELCH AMP
SW MIX
SUB
SUB LIM
LIM
DELAY
MPX
2ND
FL-6 LCB-56
4.43MHz DELAY 170ns
ELECT SW
IC6 MC14069BCP TEST OSC
TR19 to 22
FL-4 LCB-54
3.3M
FL-5 LCB-55
3.3M
PEAK ING
DE EM PHA SIS
AMP EF
R102 L23 R105
TR18 C87 D10,11 C84,85
FL-12
4.5 MHz
COLOUR KILLER
AMP TR35 TR36
DET D20 D21
COMP
INV TR37
SW TR38
COL : H
B/W : L
KILLER ON
SECAM DETECTOR
TR39 D22 D23
BPF
4.5MHz
DET
EF SW
PAL : L
SECAM : H
TR40 TR41
SECAM OFF
REC OFF
E.SW TR44
E.SW TR47
HD
IC8 AN-6362
LINEAR MM
P CON
VCO
CW OUT
PG/PAL
HD GATE
50μ MM
1/4
90° ROTATION
ROTARY CTL
DOC GATE
1/40
F.S.I
PEDST GATE
SYNC SEP
AMP
REC/DOC
SYNC
SFP
L41 C176
90° SHIFT
40fh
IC9 AN-6371
AMP
APC PC
KILLER PC
SW
ID
KILL
X VCO
B-M
X1 fs + 1/8fh 4.43557187MHz
IC10 AN-6342N
1/2771 PAL
1/1866 NTSC
1/2²
1/2³
PAL NTSC SELCT
EF
X TAL OSC
V. PULSE
X2 4.43361875MHz fs
fs + 40fh + 1/8fh 5.06057187MHz
P27
VIDEO OUT 1 1
GND 2
VIDEO IN 3
GND 4
P28
AL 12V 1
GND 2
VIDEO OUT 2 3
P26
TEST 12V 1
AL 12V 2
COL MS 3
COL MP 4
J101
1
DOC P 2
REC MUTE 3
V PULSE 4
EE 5
S.F.P 6
H.D 7
GND 8
GND 9
AL 12V 10
REC 12V 11
PB 12V 12

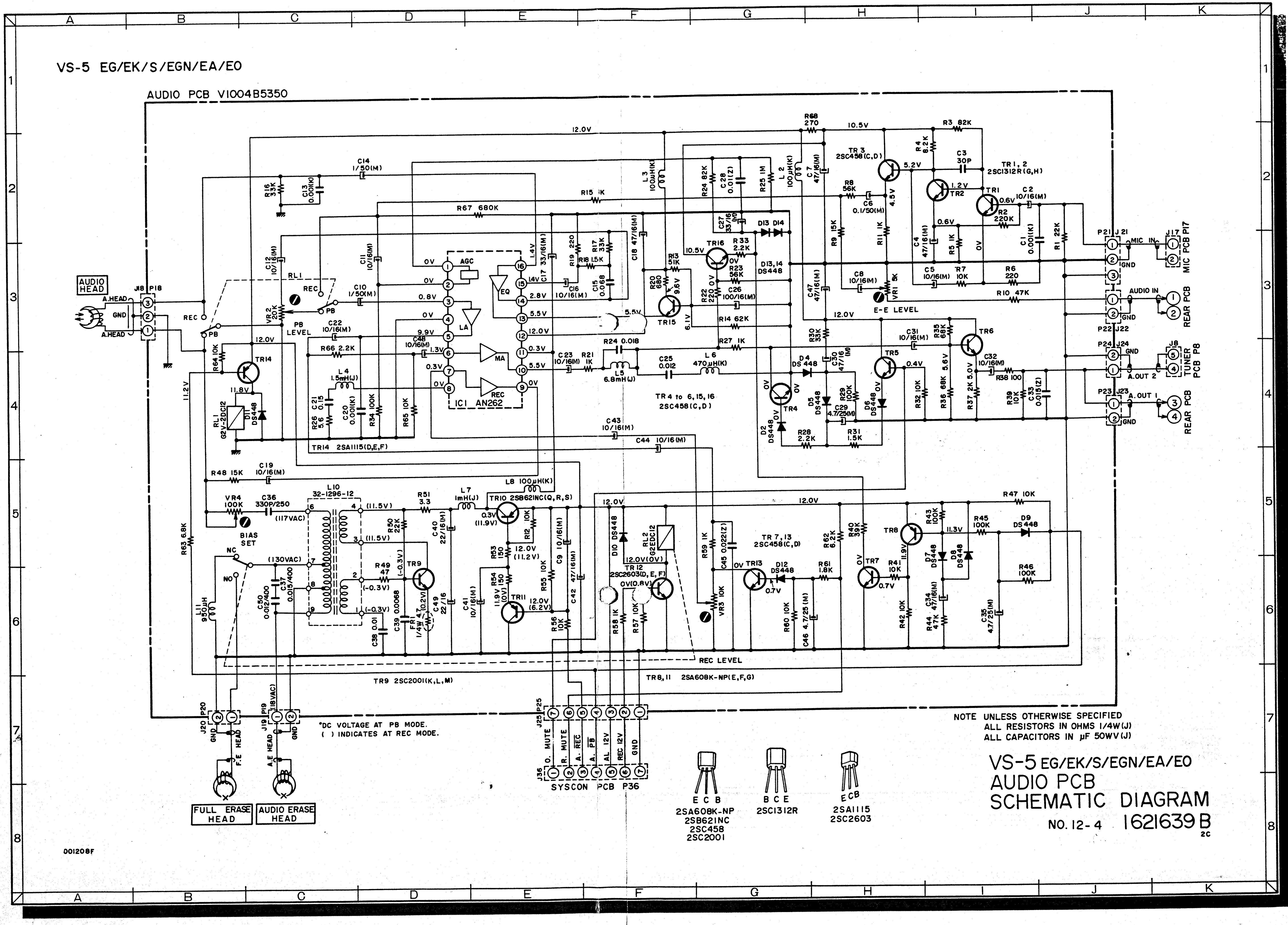
VS-5 EG/EK VIDEO
BLOCK DIAGRAM
NO. 12-2 1621637A


VS-5 EG/EK/EGN/EA/EO
VIDEO (PAL) PCB VI004A5420
DC VOLTAGE AT PB MODE (PAL)
( ) INDICATES AT REC MODE
IC1 AN6310
IC2 AN6320N
IC3 HA11718
IC4 HA11703
IC5 MC1458P
IC6 MC14069UBCP
IC7 AN6360
IC8 AN6362
IC9 AN6371
IC10 AN6342N
DL1 EFD-EN645A11E
DL2 EFD-JN124A11A
VIDEO HEAD
SERVO PCB J103
SYSCON PCB
REAR PCB P4
TUNER PCB P8
REAR PCB P3
EGN PCB P67
EGN MODEL ONLY
E C B
2SA608K-NP
2SC536NP
2SC2274K
2SB621NC
E C B
2SC2603
2SA1115

VS-5 EG/EK/EGN/EA/EO
VIDEO(PAL)
SCHEMATIC DIAGRAM
NO. 12-3 1621638B

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50 WV(J)
⊣⊢ NON-POLAR CAPACITOR

VS-5 EG/EK/S/EGN/EA/EO

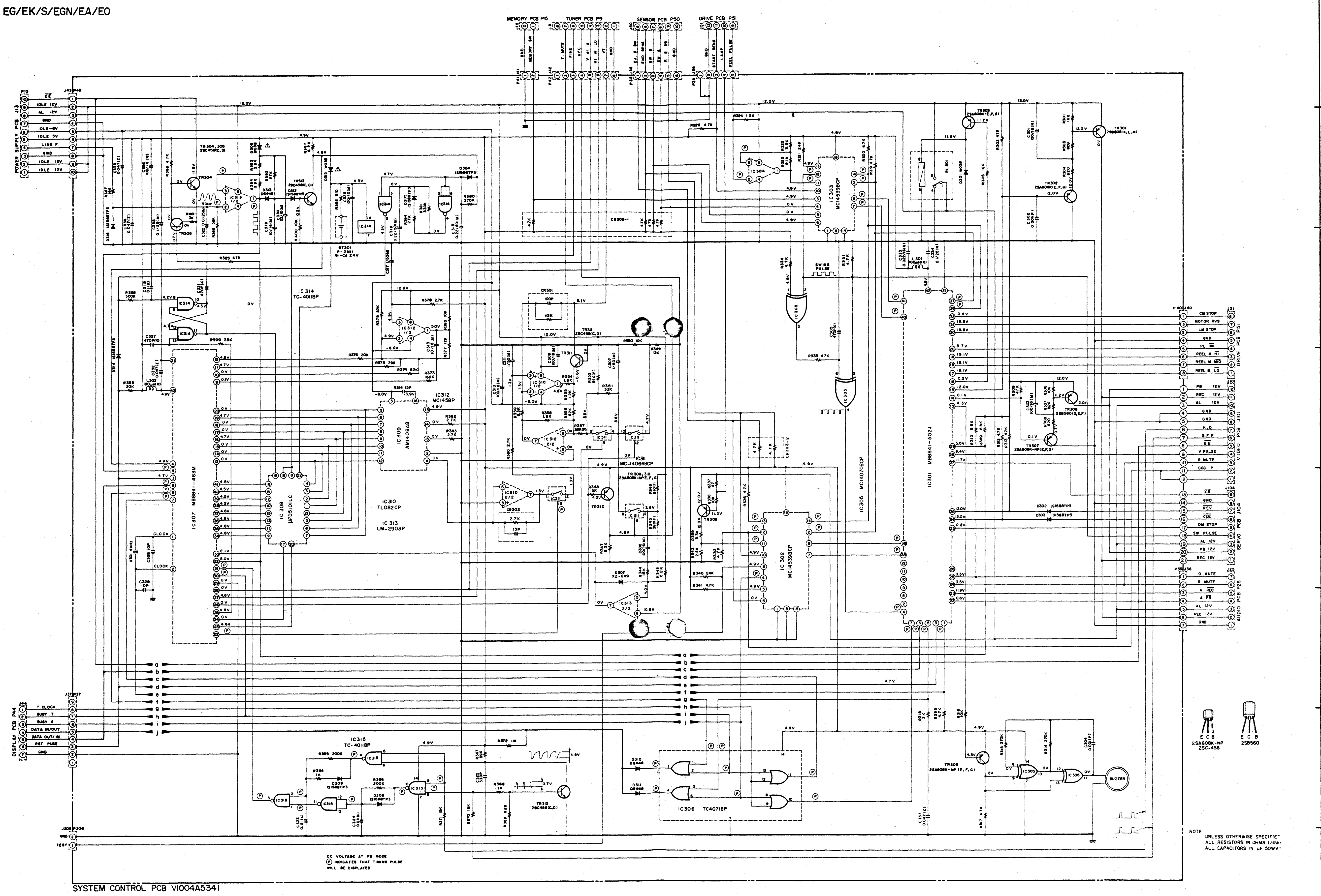

AUDIO PCB V1004B5350
12.0V
AUDIO HEAD
A.HEAD
GND
A.HEAD
J18 P18
REC
PB
RL1
VR2 20K
PB LEVEL
R16 33K
C13 0.001(K)
C14 1/50(M)
C12 10/16(M)
C11 10/16(M)
C10 1/50(M)
C22 10/16(M)
R67 680K
R15 1K
R66 2.2K
L4 1.5mH(J)
C21 0.15
R26 5.6
C20 0.001(K)
R34 100K
R65 10K
C48 10/16(M)
AGC
EQ
LA
MA
REC
IC1 AN262
R64 10K
TR14
11.8V
RL1 G2V-2DC12
D11 DS448
TR14 2SA1115(D,E,F)
C17 33/16(M)
R19 220
R16 1.5K
R17 33K
C16 10/16(M)
C15 0.068
C18 47/16(M)
L3 100μH(K)
R13 51K
R20 680
TR15
R22 220
TR16
R33 2.2K
R23 56K
C26 100/16(M)
R24 82K
C28 0.01(Z)
C27 33/16(M)
R25 1M
L2 100μH(K)
C7 47/16(M)
D13 D14
D13,14 DS448
R14 62K
R27 1K
R24 0.018
L5 6.8mH(J)
C25 0.012
L6 470μH(K)
C23 10/16(M)
R21 1K
TR4 to 6,15,16 2SC458(C,D)
C43 10/16(M)
C44 10/16(M)
R68 270
10.5V
R3 82K
TR3 2SC458(C,D)
R4 8.2K
5.2V
C3 30P
TR1,2 2SC1312R(G,H)
TR1
TR2
R8 56K
C6 0.1/50(M)
C2 10/16(M)
R2 220K
R9 15K
R11 1K
C4 47/16(M)
R5 1K
C1 0.001(K)
R1 22K
C8 10/16(M)
VR1 5K
E-E LEVEL
C5 10/16(M)
R7 10K
R6 220
R10 47K
C47 47/16(M)
R30 33K
C31 10/16(M)
R35 68K
TR6
TR5
D4 DS448
C30 47/16(M)
D5 DS448
R29 100K
C29 4.7/25(M)
D6 DS448
R32 10K
R36 68K
R37 2K
C32 10/16(M)
R38 100
R39 10K
C33 0.015(Z)
TR4
D2 DS448
R28 2.2K
R31 1.5K
P21 J21
MIC IN
J17 MIC PCB P17
AUDIO IN
REAR PCB
P22 J22
P24 J24
J8 TUNER PCB P8
A.OUT 2
P23 J23
A.OUT 1
R48 15K
C19 10/16(M)
VR4 100K
C36 330P/250
BIAS SET
L10 32-1296-12
(117VAC)
(130VAC)
R63 6.8K
NC
NO
L11 950μH
C50 0.012/400
C37 0.015/400
R51 3.3
L7 1mH(J)
L8 100μH(K)
TR10 2SB621NC(Q,R,S)
R50 22K
R49 47
TR9
C38 0.01
C39 0.0068
FR1 1/4W 4.7
C49 22/16
C40 22/16(M)
C41 10/16(M)
R53 150
R54 150
TR11
R12 10K
R55 10K
C9 10/16(M)
C42 47/16(M)
R56 10K
D10 DS448
RL2 G2EDC12
TR12 2SC2603(D,E,F)
R58 1K
R57 10K
R59 1K
C45 0.022(Z)
VR3 10K
REC LEVEL
TR7,13 2SC458(C,D)
TR13
D12 DS448
R60 10K
C46 4.7/25(M)
R61 1.8K
R62 6.2K
R40 39K
TR7
R42 10K
TR8
R43 100K
R41 10K
D7 DS448
D8 DS448
C34 47/16(M)
R44 47K
R45 100K
R47 10K
D9 DS448
R46 100K
C35 4.7/25(M)
TR9 2SC2001(K,L,M)
TR8,11 2SA608K-NP(E,F,G)
J20 P20
GND
F.E HEAD
J19 P19
(18VAC)
A.E HEAD
FULL ERASE HEAD
AUDIO ERASE HEAD
J25 P25
J36
O. MUTE
R. MUTE
A. REC
A. PB
AL 12V
REC 12V
GND
SYSCON PCB P36
E C B
2SA608K-NP
2SB621NC
2SC458
2SC2001
B C E
2SC1312R
E C B
2SA1115
2SC2603
001208F

*DC VOLTAGE AT PB MODE.
( ) INDICATES AT REC MODE.

NOTE UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)

VS-5 EG/EK/S/EGN/EA/EO
AUDIO PCB
SCHEMATIC DIAGRAM
NO. 12-4 1621639 B
2C

VS-5 EG/EK/S/EGN/EA/EO


MEMORY PCB P15
GND
MEMORY SW
TUNER PCB P9
T. MUTE
FINE
AFC
V or U
HI or LO
VT
GND
SENSOR PCB P50
EJ. S. SW
END SENS
SW B
SW A
R. S. SW
GND
DRIVE PCB P51
GND
START SENS
LAMP
REEL PULSE
POWER SUPPLY PCB J13
P13
J43 P43
EE
IDLE 12V
AL 12V
GND
IDLE-8V
IDLE 5V
LINE F
GND
IDLE 12V
IDLE 12V
12.0V
TR304, 305 2SC458(C, D)
IC313
TR313 2SC458(C, D)
BT301 P-2MII Ni-Cd 24V
IC314
IC314 TC-4011BP
CR301
TR311 2SC458(C, D)
IC310
IC311
IC312
CR302
CR303-1
IC304
IC303 MC14398CP
TR303 2SA608K(E, F, G)
TR301 2SB560(K, L, M)
TR302 2SA608K(E, F, G)
RL301
IC307 MB8841-463M
IC308 μPD501LC
IC309 AM1408A8
IC310 TL082CP
IC313 LM-2903P
IC312 MC1458P
IC311 MC-140668CP
TR309, 310 2SA608K-NP(E, F, G)
TR310
TR309
IC305
IC305 MC14070BCP
IC302 MC14539BCP
CR303-2
SWING PULSE
IC301 MB8841-502J
TR306 2SB560(D, E, F)
TR307 2SA608K-NP(E, F, G)
D302 1S1588TP3
D303 1S1588TP3
P40 J40
J51
CM STOP
MOTOR RVS
LM. STOP
GND
PL ON
REEL M HI
REEL M MID
REEL M LO
DRIVE PCB P51
J101
PB 12V
REC 12V
AL 12V
GND
GND
H. D
S. F. P
E E
V. PULSE
R. MUTE
DOC. P
VIDEO PCB J101
J104
X2
GND
REV
CUE
DM STOP
SW PULSE
AL 12V
PB 12V
REC 12V
SERVO PCB J104
P36 J36
J25
O. MUTE
R. MUTE
A. REC
A. PB
AL 12V
REC 12V
GND
AUDIO PCB P25
DISPLAY PCB P44
J44
J37 P37
T. CLOCK
BUSY. T
BUSY. S
DATA IN/OUT
DATA OUT/IN
RST. PUSE
GND
IC315 TC-4011BP
IC316
TR312 2SC458(C, D)
IC306 TC4071BP
TR308 2SA608K-NP(E, F, G)
BUZZER
J206 P206
GND
TEST
E C B
2SA608K-NP
2SC-458
E C B
2SB560

DC VOLTAGE AT PB MODE
Ⓟ INDICATES THAT TIMING PULSE WILL BE DISPLAYED.

NOTE
UNLESS OTHERWISE SPECIFIE
ALL RESISTORS IN OHMS 1/4W
ALL CAPACITORS IN μF 50WV

SYSTEM CONTROL PCB V1004A5341

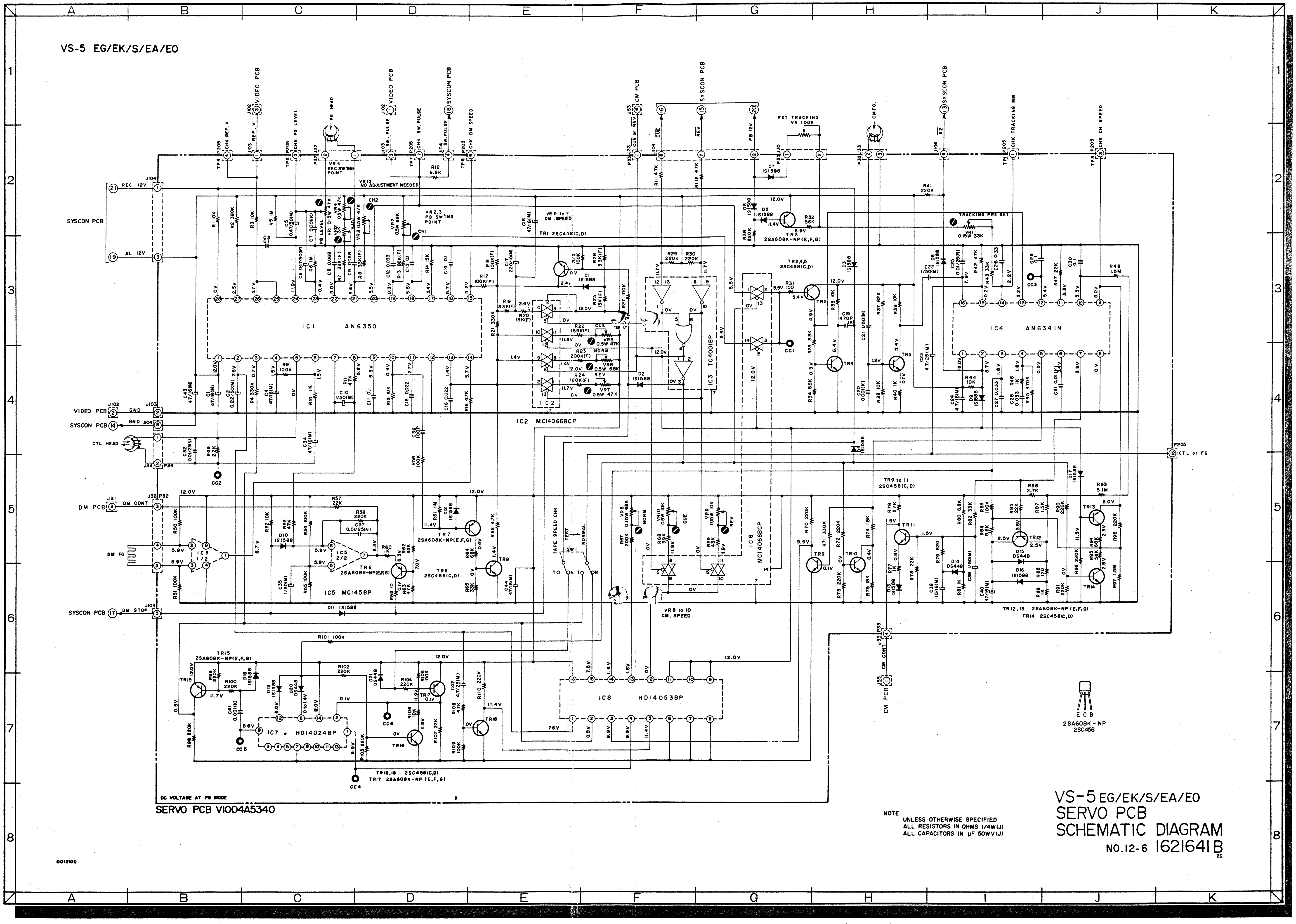
WARNING △ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT △ IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES CONPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

# VS-5 EG/EK/S/EGN/EA/EO SYSCON SCHEMATIC DIAGRAM NO. 12-5 1621640B

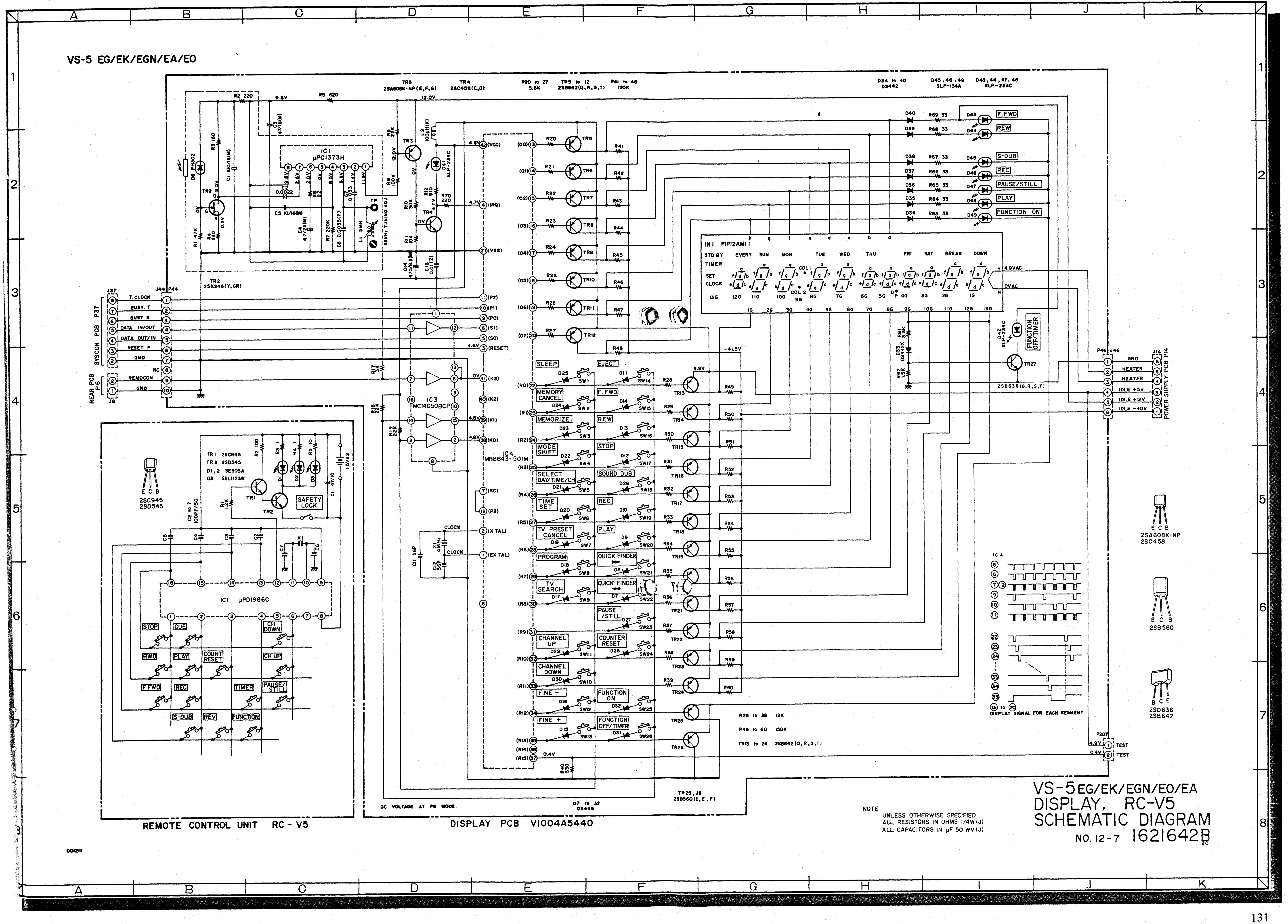
2C

0012090


VS-5 EG/EK/S/EA/EO
A
B
C
D
E
F
G
H
I
J
K
SYSCON PCB
REC 12V
AL 12V
VIDEO PCB
GND
CTL HEAD
DM PCB
DM CONT
DM FG
DM STOP
J104
J103
J102
J34
P34
J31
J32 P32
VIDEO PCB
SYSCON PCB
PG HEAD
CM PCB
CM FG
EXT TRACKING VR 100K
CHK REF. V
REF. V
CHK PG LEVEL
REC SW'ING POINT
SW. PULSE
CHK SW. PULSE
CHK DM SPEED
CUE or REV
CUE
REV
PB 12V
X2
CHK TRACKING MM
CHK CH SPEED
VR12 NO ADJUSTMENT NEEDED
VR2,3 PB SW'ING POINT
VR 5 to 7 DM. SPEED
PG LEVEL
TRACKING PRE SET
IC1 AN6350
IC2 MC14066BCP
IC3 TC4001BP
IC4 AN6341N
IC5 MC1458P
IC6 MC14066BCP
IC7 HD14024BP
IC8 HD14053BP
TR1 2SC458(C,D)
TR2,4,5 2SC458(C,D)
TR3 2SA608K-NP(E,F,G)
TR6 2SA608K-NP(E,F,G)
TR7 2SA608K-NP(E,F,G)
TR8 2SC458(C,D)
TR9 to 11 2SC458(C,D)
TR12,13 2SA608K-NP(E,F,G)
TR14 2SC458(C,D)
TR15 2SA608K-NP(E,F,G)
TR16,18 2SC458(C,D)
TR17 2SA608K-NP(E,F,G)
TAPE SPEED CHK
TEST
NORMAL
SW1
VR8 to 10 CM. SPEED
NORM
CUE
REV
CTL or FG
P205
CM CONT
CC1
CC2
CC3
CC4
CC5
CC6
CH1
CH2
E C B
2SA608K-NP
2SC458
DC VOLTAGE AT PB MODE
SERVO PCB V1004A5340
0012100

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN µF 50WV(J)

VS-5 EG/EK/S/EA/EO
SERVO PCB
SCHEMATIC DIAGRAM
NO.12-6 1621641B
2C


VS-5 EG/EK/EGN/EA/EO
A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8
IC1 μPC1373H
38KHz TUNING ADJ
TR2 2SK246(Y,GR)
TR3 2SA608K-NP(E,F,G)
TR4 2SC458(C,D)
R20 to 27 5.6K
TR5 to 12 2SB642(Q,R,S,T)
R41 to 48 150K
D34 to 40 DS442
D45, 46, 49 SLP-134A
D43, 44, 47, 48 SLP-234C
F.FWD
REW
S-DUB
REC
PAUSE/STILL
PLAY
FUNCTION ON
IN1 FIP12AM11
STD BY
TIMER
SET
CLOCK
EVERY
SUN
MON
TUE
WED
THU
FRI
SAT
BREAK
DOWN
COL 1
COL 2
4.9VAC
0VAC
FUNCTION OFF/TIMER
TR27
2SD636(Q,R,S,T)
J37
P37
SYSCON PCB
T.CLOCK
BUSY.T
BUSY.S
DATA IN/OUT
DATA OUT/IN
RESET P
GND
NC
REAR PCB P6
REMOCON
GND
J6
J44
P44
IC3 TMC14050BCP
IC4 MB8843-501M
(VCC)
(IRQ)
(VSS)
(RESET)
(X TAL)
(EX TAL)
CLOCK
X1 4MHz
SLEEP
EJECT
MEMORY CANCEL
F.FWD
MEMORIZE
REW
MODE SHIFT
STOP
SELECT DAY/TIME/CH
SOUND DUB
TIME SET
REC
TV PRESET CANCEL
PLAY
PROGRAM
QUICK FINDER
QUICK FINDER
TV SEARCH
PAUSE /STILL
CHANNEL UP
COUNTER RESET
CHANNEL DOWN
FINE −
FUNCTION ON
FINE +
FUNCTION OFF/TIMER
-41.3V
R28 to 39 12K
R49 to 60 150K
TR13 to 24 2SB642(Q,R,S,T)
TR25, 26 2SB560(D,E,F)
D7 to 32 DS448
P46
J46
J14
GND
HEATER
HEATER
IDLE +5V
IDLE +12V
IDLE −40V
POWER SUPPLY PCB P14
P207
TEST
TEST
IC4
DISPLAY SIGNAL FOR EACH SEGMENT
E C B
2SA608K-NP
2SC458
E C B
2SB560
B C E
2SD636
2SB642
E C B
2SC945
2SD545
TR1 2SC945
TR2 2SD545
D1, 2 SE303A
D3 SEL1123W
SAFETY LOCK
C2 to 7 100PF/50
IC1 μPD1986C
STOP
CUE
CH DOWN
RWD
PLAY
COUNT RESET
CH UP
F.FWD
REC
TIMER
PAUSE/ STILL
S-DUB
REV
FUNCTION
DC VOLTAGE AT PB MODE.
001211

REMOTE CONTROL UNIT RC - V5

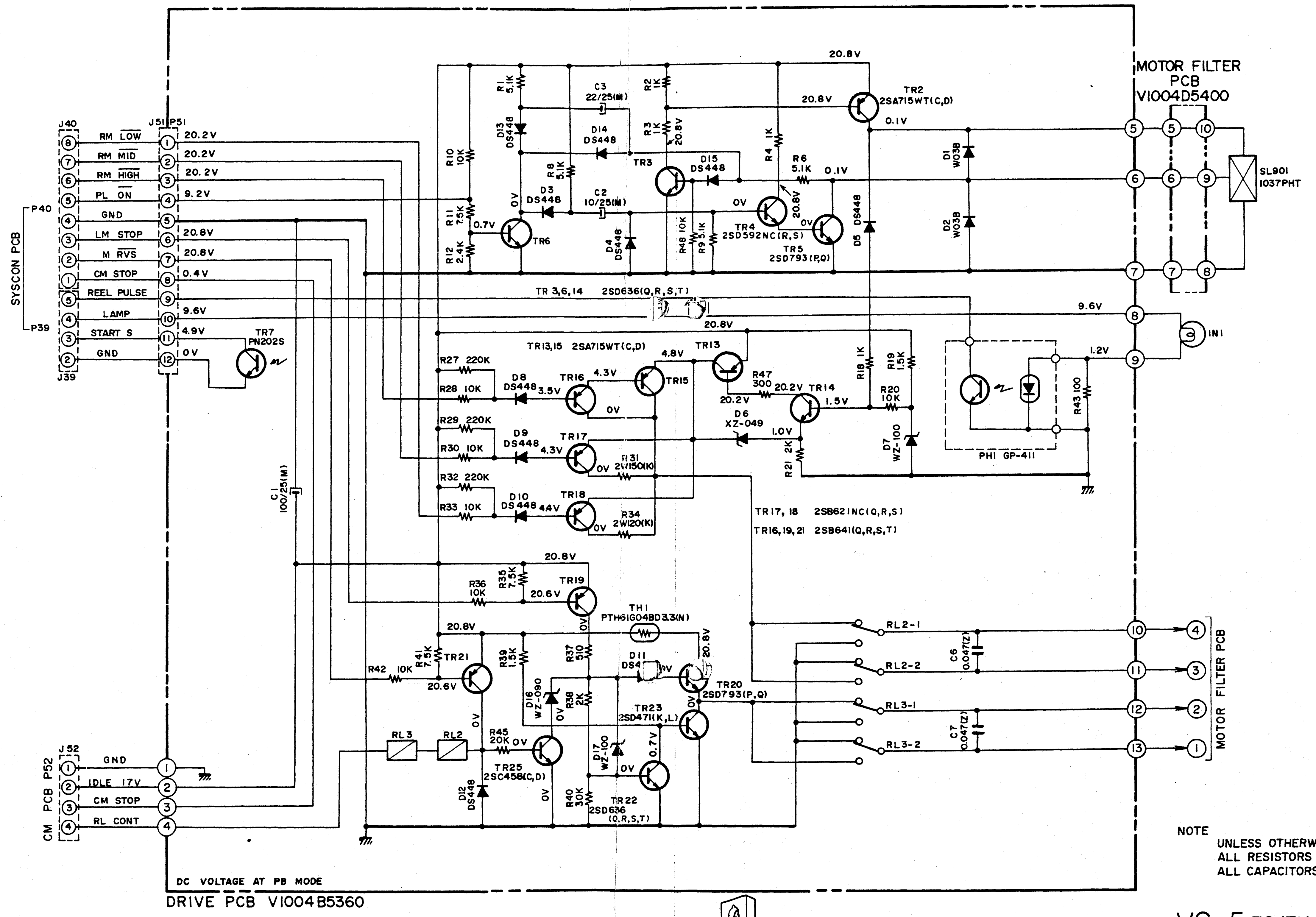
DISPLAY PCB V1004A5440

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50 WV(J)

# VS-5 EG/EK/EGN/EO/EA
# DISPLAY, RC-V5
# SCHEMATIC DIAGRAM

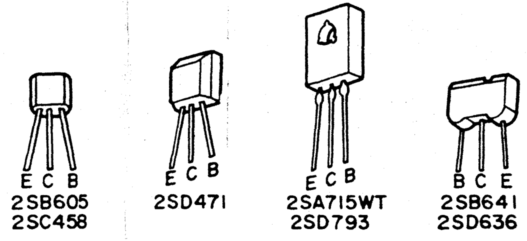
NO. 12-7 1621642B 2C

VS-5 EG/EK/S/EGN/EA/EO



MOTOR FILTER PCB V1004D5400
DRIVE PCB V1004B5360
DC VOLTAGE AT PB MODE
SYSCON PCB
P40
P39
J40
J51 P51
J39
RM LOW
RM MID
RM HIGH
PL ON
GND
LM STOP
M RVS
CM STOP
REEL PULSE
LAMP
START S
GND
20.2V
20.2V
20.2V
9.2V
20.8V
20.8V
0.4V
9.6V
4.9V
0V
TR7 PN202S
CM PCB P52
J52
GND
IDLE 17V
CM STOP
RL CONT
C1 100/25(M)
20.8V
TR2 2SA715WT(C,D)
0.1V
R1 5.1K
R2 1K
R3 1K
R4 1K
R6 5.1K
C3 22/25(M)
C2 10/25(M)
D13 DS448
D14 DS448
D15 DS448
D3 DS448
D4 DS448
D5 DS448
R8 5.1K
R10 10K
R11 7.5K
R12 2.4K
R48 10K
R9 5.1K
TR3
TR4 2SD592NC(R,S)
TR5 2SD793(P,Q)
TR6
0.7V
D1 W03B
D2 W03B
SL901 1037PHT
TR 3,6,14 2SD636(Q,R,S,T)
9.6V
IN1
1.2V
TR13,15 2SA715WT(C,D)
TR13
TR14
TR15
TR16
TR17
TR18
R27 220K
R28 10K
R29 220K
R30 10K
R32 220K
R33 10K
D8 DS448
D9 DS448
D10 DS448
R31 2W150(K)
R34 2W120(K)
R47 300
D6 XZ-049
R21 2K
R18 1K
R19 1.5K
R20 10K
D7 WZ-100
R43 100
PH1 GP-411
TR17, 18 2SB621NC(Q,R,S)
TR16,19,21 2SB641(Q,R,S,T)
TR19
R35 7.5K
R36 10K
TH1 PTH61604BD33(N)
TR20 2SD793(P,Q)
TR21
R41 7.5K
R42 10K
R39 1.5K
R37 510
R38 2K
D11 DS4
D16 WZ-090
D17 WZ-100
TR23 2SD471(K,L)
TR22 2SD636 (Q,R,S,T)
R40 30K
R45 20K
TR25 2SC458(C,D)
D12 DS448
RL3
RL2
RL2-1
RL2-2
RL3-1
RL3-2
C6 0.047(Z)
C7 0.047(Z)
MOTOR FILTER PCB

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)



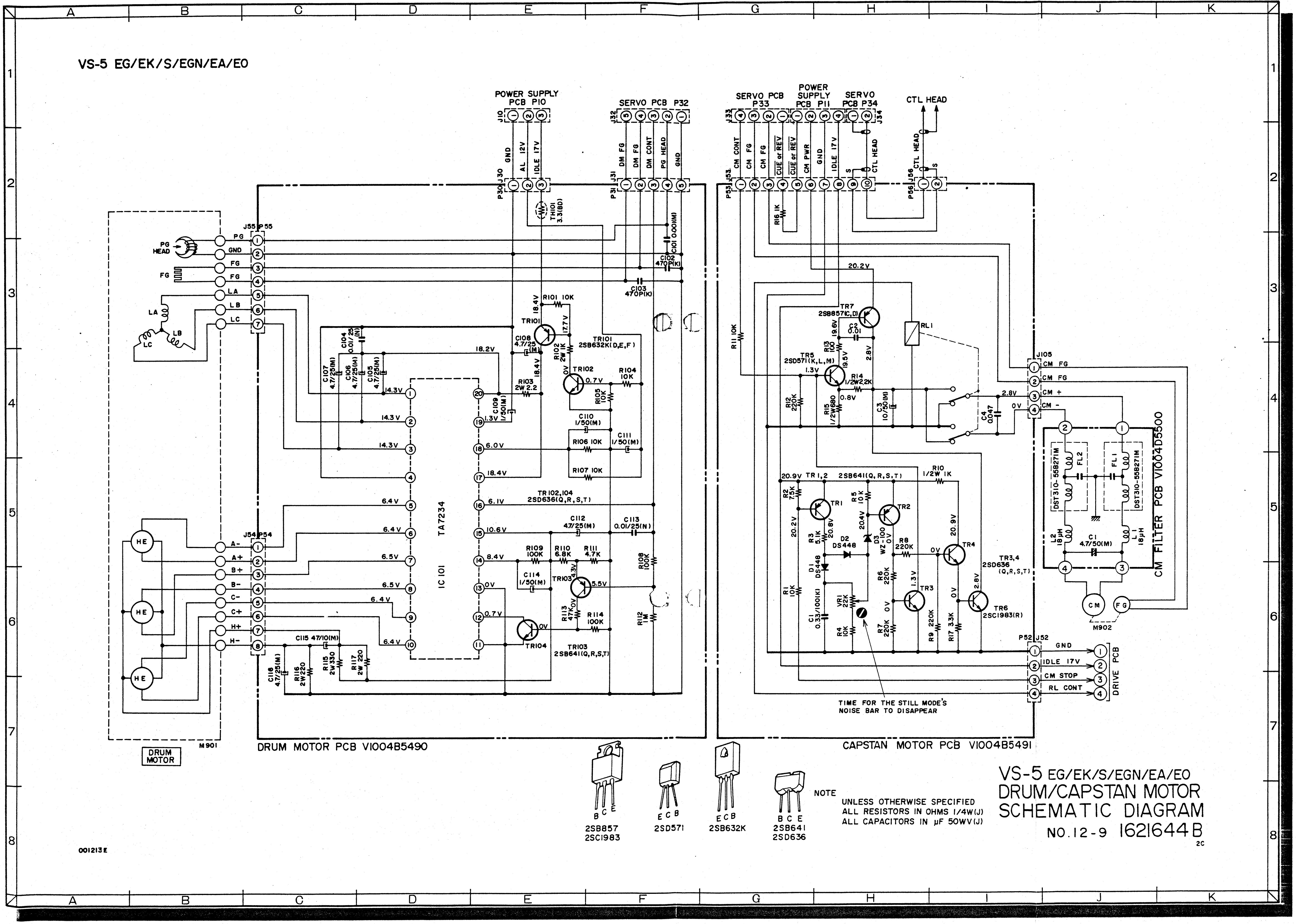
E C B
2SB605
2SC458
E C B
2SD471
E C B
2SA715WT
2SD793
B C E
2SB641
2SD636

# VS-5 EG/EK/S/EGN/EA/EO
# DRIVE PCB
# SCHEMATIC DIAGRAM

NO. 12-8 1621643B
2C

001212E

## VS-5 EG/EK/S/EGN/EA/EO



A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8
POWER SUPPLY PCB P10
J10
GND
AL 12V
IDLE 17V
P30 J30
TH101 3.3(8D)
SERVO PCB P32
J32
DM FG
DM FG
DM CONT
PG HEAD
GND
P31 J31
SERVO PCB P33
J33
CM CONT
CM FG
CM FG
CUE or REV
CUE or REV
POWER SUPPLY PCB P11
CM PWR
GND
IDLE 17V
SERVO PCB P34
J34
CTL HEAD
P53 J53
S
CTL HEAD
P56 J56
PG HEAD
FG
LA
LB
LC
J55 P55
PG
GND
FG
FG
LA
LB
LC
C101 0.001(M)
C102 470P(K)
C103 470P(K)
R16 1K
R11 10K
20.2V
TR7 2SB857(C,D)
19.6V
C2 0.01
R13 100
TR5 2SD571(K,L,M)
1.3V
19.5V
2.8V
R14 1/2W22K
0.8V
R12 220K
R15 1/2W680
C3 10/50(M)
RL1
C4 0.047
2.8V
0V
J105
CM FG
CM FG
CM +
CM -
18.4V
R101 10K
TR101
C108 4.7/25(M)
17.7V
R102 2W 1K
TR101 2SB632K(D,E,F)
C104 0.01/25(N)
18.2V
18.4V
TR102
0V
0.7V
R104 10K
R105 10K
R103 2W 2.2
C107 4.7/25(M)
C106 4.7/25(M)
C105 4.7/25(M)
14.3V
14.3V
14.3V
C109 1/50(M)
1.3V
6.0V
18.4V
C110 1/50(M)
C111 1/50(M)
R106 10K
R107 10K
TA7234
IC101
6.4V
6.4V
6.5V
6.5V
6.4V
6.4V
6.1V
10.6V
8.4V
0V
0.7V
TR102,104 2SD636(Q,R,S,T)
C112 4.7/25(M)
C113 0.01/25(N)
R109 100K
R110 6.8K
R111 4.7K
R108 100K
C114 1/50(M)
TR103
4.3V
5.5V
R113 47K
0V
R114 100K
R112 1M
TR104
0V
TR103 2SB641(Q,R,S,T)
HE
HE
HE
J54 P54
A-
A+
B+
B-
C-
C+
H+
H-
C115 47/10(M)
C116 4.7/25(M)
R116 2W220
R115 2W330
R117 2W220
M901
DRUM MOTOR
DRUM MOTOR PCB V1004B5490
20.9V
TR1,2 2SB641(Q,R,S,T)
R10 1/2W 1K
R2 7.5K
R5 10K
TR1
TR2
20.2V
R3 5.1K
20.8V
20.4V
D3 WZ-100
0V
D2 DS448
R8 220K
0V
20.9V
TR4
TR3,4 2SD636 (Q,R,S,T)
D1 DS448
R1 10K
VR1 22K
R6 220K
1.3V
TR3
0V
2.8V
TR6 2SC1983(R)
C1 0.33/100(K)
R4 10K
R7 220K
R9 220K
R17 3.3K
P52 J52
GND
IDLE 17V
CM STOP
RL CONT
DRIVE PCB
TIME FOR THE STILL MODE'S NOISE BAR TO DISAPPEAR
CAPSTAN MOTOR PCB V1004B5491
DST310-55B271M
FL2
FL1
DST310-55B271M
L2 18μH
C1 4.7/50(M)
L1 18μH
CM FILTER PCB V1004D5500
CM
FG
M902
B C E
2SB857
2SC1983
E C B
2SD571
E C B
2SB632K
B C E
2SB641
2SD636
001213E

NOTE

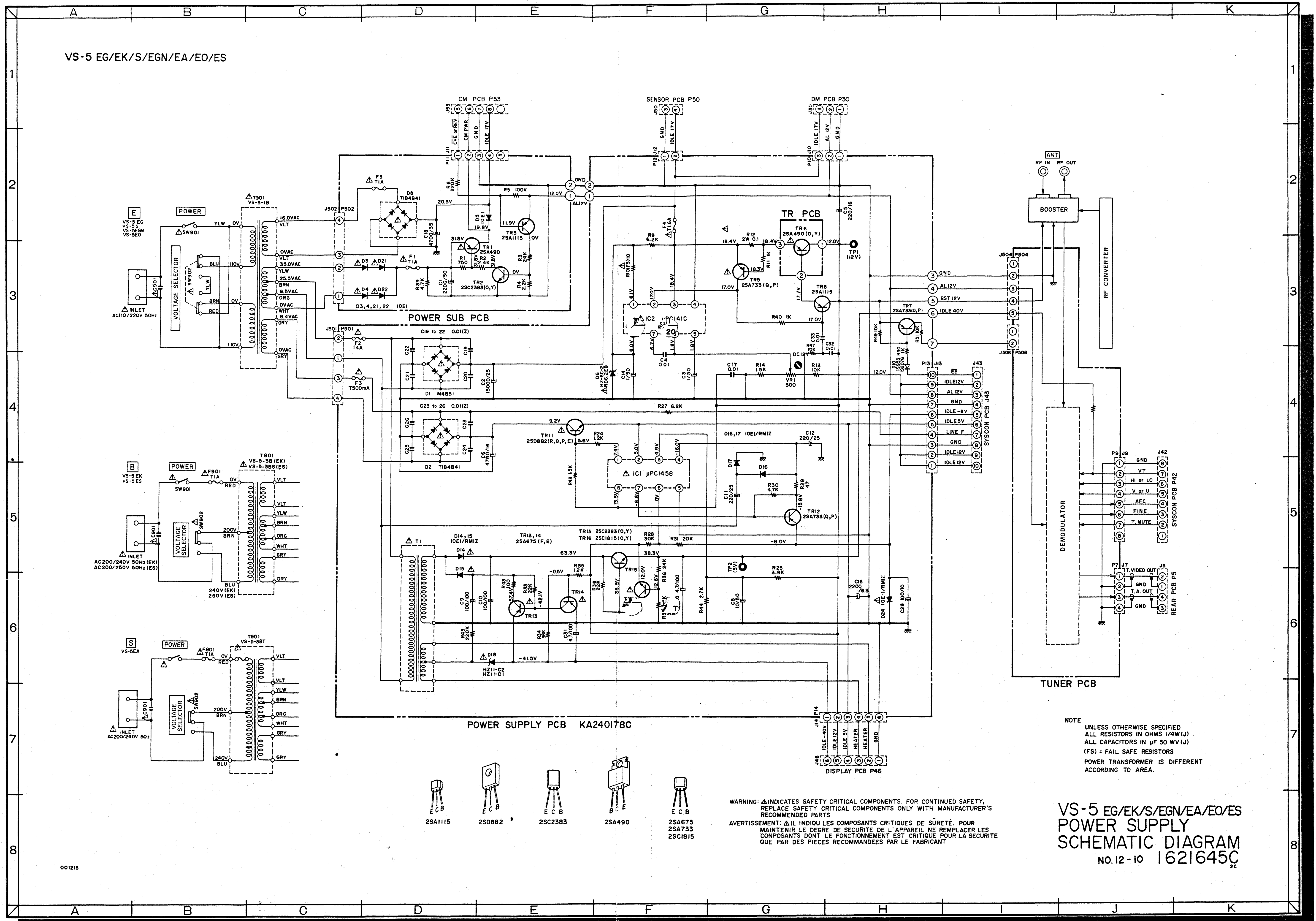
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)

## VS-5 EG/EK/S/EGN/EA/EO
## DRUM/CAPSTAN MOTOR
## SCHEMATIC DIAGRAM

NO.12-9 1621644B

2C

VS-5 EG/EK/S/EGN/EA/EO/ES


CM PCB P53
SENSOR PCB P50
DM PCB P30
TR PCB
POWER SUB PCB
POWER SUPPLY PCB KA240178C
TUNER PCB
BOOSTER
RF CONVERTER
DEMODULATOR
ANT
RF IN
RF OUT
SYSCON PCB J43
SYSCON PCB P42
REAR PCB P5
DISPLAY PCB P46
T901 VS-5-1B
T901 VS-5-3B(EK) VS-5-3BS(ES)
T901 VS-5-3BT
VOLTAGE SELECTOR
POWER
SW901
SW902
INLET AC110/220V 50Hz
INLET AC200/240V 50Hz(EK) AC200/250V 50Hz(ES)
INLET AC200/240V 50z
IC1 μPC1458
IC2 μPC141C
2SA1115
2SD882
2SC2383
2SA490
2SA675
2SA733
2SC1815
E C B
B C E

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50 WV(J)
(FS) = FAIL SAFE RESISTORS
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA.

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

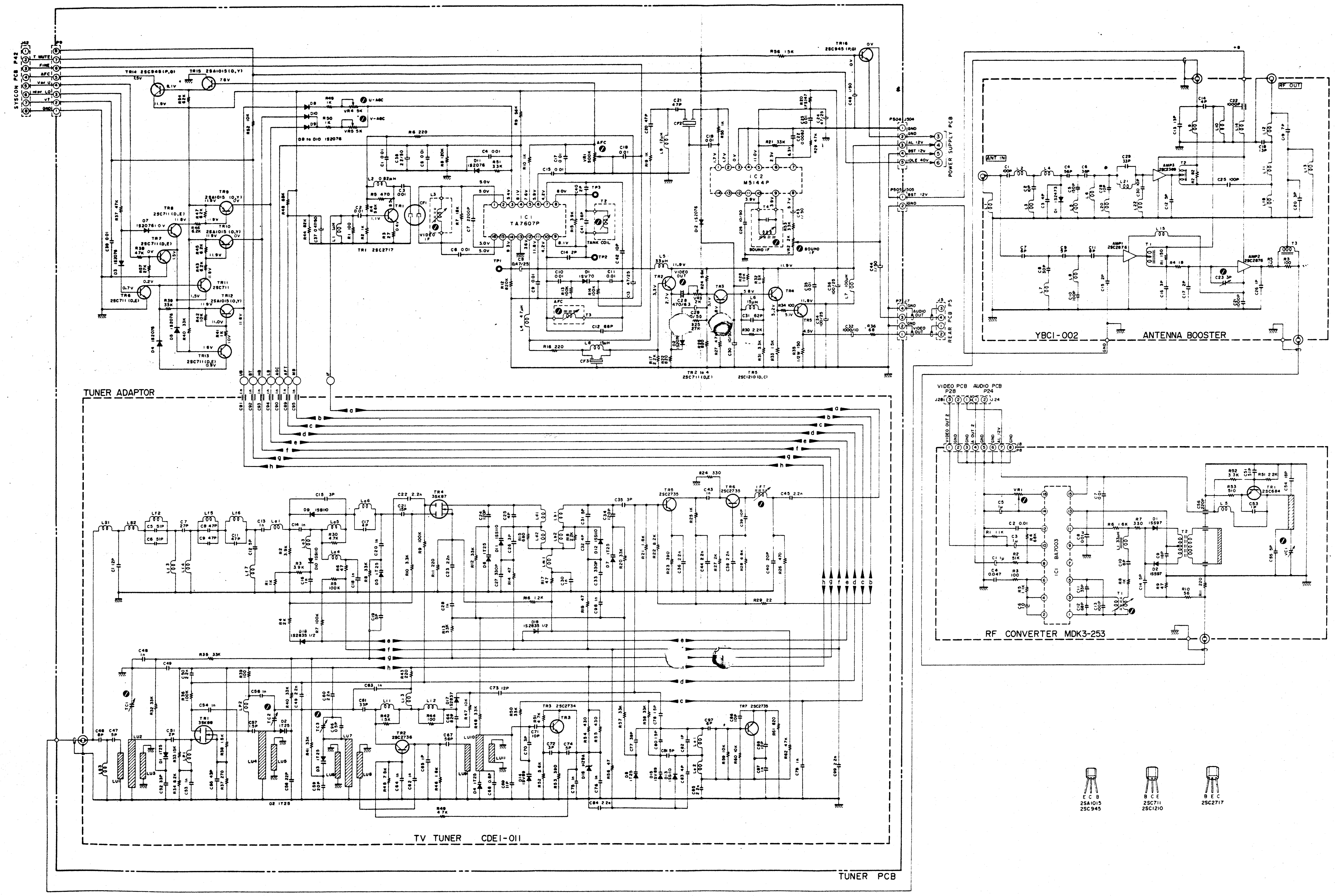
AVERTISSEMENT: ⚠IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

## VS-5 EG/EK/S/EGN/EA/EO/ES POWER SUPPLY SCHEMATIC DIAGRAM

NO.12-10 1621645C
2C

001215

VS-5 EG

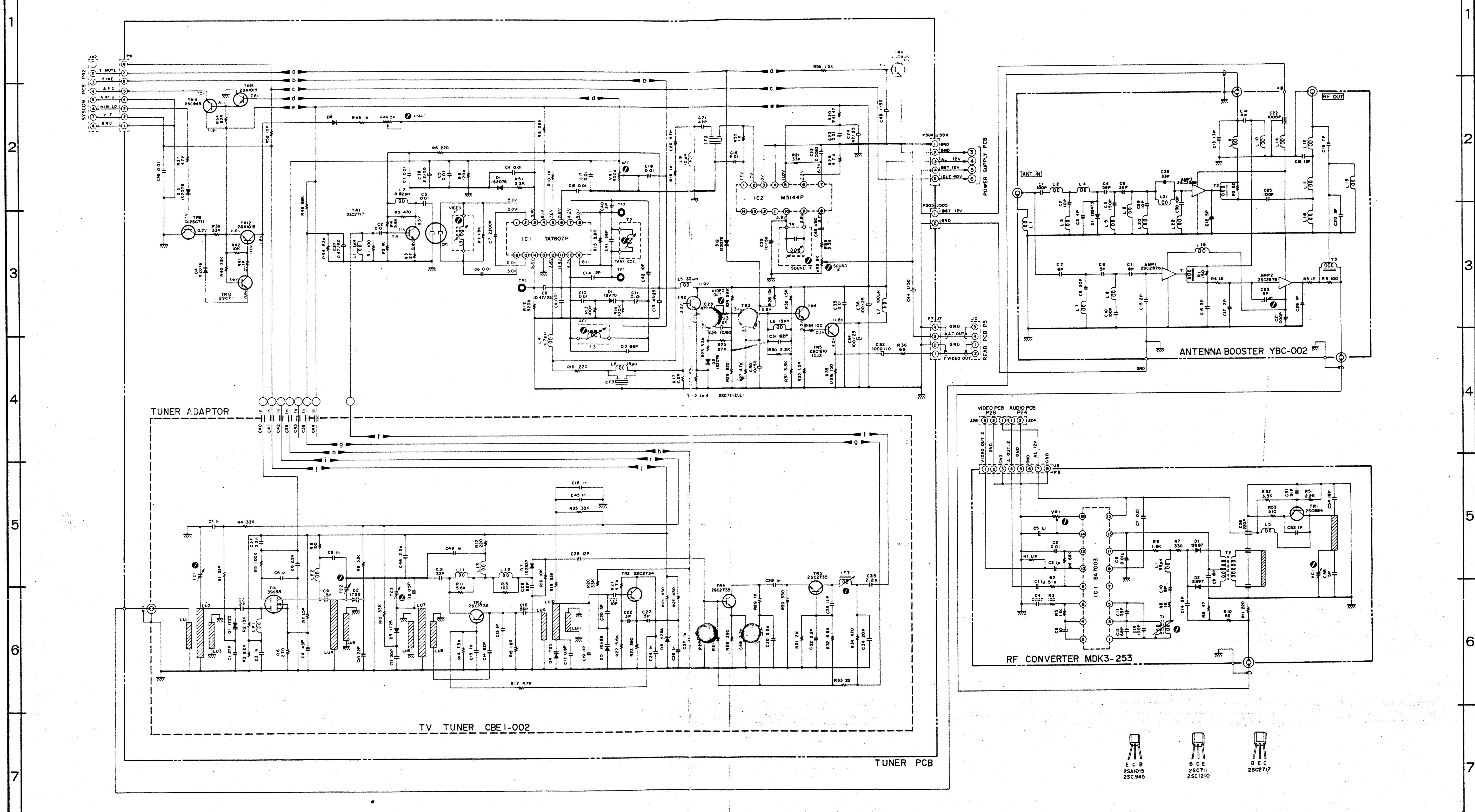

SYSCON PCB P42
TUNER PCB
TUNER ADAPTOR
TV TUNER CDE1-011
IC1 TA7607P
IC2 M5144P
POWER SUPPLY PCB
REAR PCB P5
ANT IN
RF OUT
YBC1-002 ANTENNA BOOSTER
VIDEO PCB P28
AUDIO PCB P24
RF CONVERTER MDK3-253
2SA1015
2SC945
2SC711
2SC1210
2SC2717

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/8W
ALL CAPACITORS IN µF 50WV

## VS-5 EG TUNER
## SCHEMATIC DIAGRAM

NO.12-11 1621646A

VS-5 EK


SYSCON PCB P42
J42
P9
T MUTE
FINE
A F C
V or U
H or L
V T
GND
IC1 TA7607P
IC2 M5144P
TANK COIL
SOUND IF
POWER SUPPLY PCB
P504 J504
P505 J505
GND
AL 12V
BST 12V
IDLE 40V
P7 J7
GND
A.AT.OUT A
T.VIDEO OUT
REAR PCB P5
T-2 to 4 2SC711(D,E)
TUNER ADAPTOR
TV TUNER CBE1-002
TUNER PCB
ANT IN
RF OUT
ANTENNA BOOSTER YBC-002
AMP1 2SC2876
AMP2 2SC2876
AMP3 2SC2876
VIDEO PCB P26
AUDIO PCB P24
J28
J24
VIDEO OUT 2
A OUT 2
AL 12V
IC1 BA7003
TR1 2SC684
RF CONVERTER MDK3-253
E C B
2SA1015
2SC945
B C E
2SC711
2SC1210
B E C
2SC2717
A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/8W(J)
ALL CAPACITORS IN µF 50WV(J)

# VS-5 EK TUNER SCHEMATIC DIAGRAM

NO.12-12 1621647A

001217